



FIVE YEAR REVIEW

**NAVAL AIR WARFARE CENTER (NAWC)
INDIANAPOLIS, INDIANA**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:
Southern Division
Naval Facilities Engineering Command
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**CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0336**

MAY 2004

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ACTING COMMANDER, SOUTHERN DIVISION, NAVFAC**

6/7/2004

DATE

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ACRONYMS

AOC	Area of Concern
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closing
COPC	Chemicals of Potential Concern
DCE	Dichloroethene
EBS	Environmental Baseline Survey
EBST	Environmental Baseline Survey for Transfer
EE/CA	Engineering Evaluation/Cost Assessment
EPA	Environmental Protection Agency
FOST	Finding of Suitability to Transfer
HQ	Hazard Quotient
HRC	Hydrogen Release Compound
IDEM	Indiana Department of Environmental Management
IR	Installation Restoration
IRPA	Indianapolis Reuse Planning Authority
LUC	Land Use Controls
MCL	Maximum Contaminant Level
NAVFAC EFD SOUTH	Naval Facilities Southern Division
NAWC	Naval Air Warfare Center
NCP	National Contingency Plan
O&M	Operation and Maintenance
PRG	Preliminary Remedial Goal
RAB	Restoration Advisory Board
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
SSL	Soil Screening Levels
TSD	Treatment, Storage, or Disposal
ug/L	Microgram Per Liter
USEPA	United States Environmental Protection Agency
USG	United States Geological Survey
VSIs	Visual Site Inspections

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name (from WasteLAN): US Navy Avionics Center		
EPA ID (from WasteLAN): IN4170023499		
Region: 5	State: IN	City/County: Indianapolis/Marion
SITE STATUS		
NPL status: <input type="checkbox"/> Final <input type="checkbox"/> Deleted <input checked="" type="checkbox"/> Other (specify) Non-NPL		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction completion date: 06/09/1999	
Has site been put into reuse? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input checked="" type="checkbox"/> Other Federal Agency DOD/Navy		
Author name: NAVFACENGCOM, Southern Division, Charleston		
Author title:	Author affiliation: Lead Agency	
Review period:** 03/01/2004 to 06/09/2004		
Date(s) of site inspection: NA		
Type of review: <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input checked="" type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL-State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number: <input checked="" type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Construction Completion <input type="checkbox"/> Other (specify)		
<input checked="" type="checkbox"/> Actual RA Start at OU # AOC 1 <input type="checkbox"/> Previous Five-Year Review Report		
Triggering action date (from WasteLAN): 06/09/1999		
Due Date (five years after triggering action date): 06/09/2004		

*["OU" refers to operable unit.]

**[Review period should correspond to the actual start and end states of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

None.

Recommendations and Follow-up Actions:

See Section 9.0 of the document for discussion about:

- Recommending revised remedy for AOC 5, AOC 7, and AOC 18.
- Recommending revised remedy for AOC 2, AOC 4, AOC 10, and AOC 16.
- Other

Protectiveness Statement(s):

Because the remedial actions at all AOCs are protective, the site is protective of human health and the environment.

Other Comments:

EXECUTIVE SUMMARY

Eighteen (18) Areas of Concern and one (1) Installation Restoration site (IR Site) have been identified at NAWC Indianapolis. Remedial actions specified for each AOC are presented in the following tables. Eight (8) AOCs required no remedial action. For six (6) additional AOCs, Land Use Controls were selected as the preferred remedy, while for the final four (4) AOCs, a combination of hydrogen release compound (HRC injection) and Land Use Controls were selected. The HRC is designed to accelerate naturally occurring natural attenuation by increasing the level of microbial activity. In June 2000, onsite design of the HRC injection compound remedy was initiated. In August 2000, the onsite construction was completed at AOC 2, AOC 4, AOC 10, and AOC 16. No remedy has been selected for the IR Site. Additional chronology details are provided in Section 2 of this Five Year Review.

No media sampling has occurred since July 2002 as the BCT evaluates the risk assessment solutions. There are no Operation and Maintenance (O&M) functions associated with these remedial activities.

The assessment of this Five Year Review found that because the remedial actions at all AOCs are protective, the Site is protective of human health and the environment.

This is the first Five Year Review for AOC 1, AOC 2, AOC 4, AOC 5, AOC 7, AOC 9, AOC 10, AOC 15, AOC 16, and AOC 18 at NAWC Indianapolis. Although the remedy selection date for AOC 1 is driving the requirement to complete this Five Year Review, all AOCs and the IR Site are being included. Because no remedy has been selected at the IR site, it will be addressed under the next Five Year Review.

1.0 INTRODUCTION

The United States Navy, Southern Division, NAVFACENGCOM, has conducted a Five-Year Review of the remedial actions implemented at AOC 1, AOC 2, AOC 4, AOC 5, AOC 7, AOC 9, AOC 10, AOC 15, AOC 16, and AOC 18 at the Naval Air Warfare Center (NAWC) Indianapolis site in Indianapolis, Indiana. This report documents the results of the review. This Five Year Review was prepared consistent with EPA's Comprehensive Five Year Review Guidance (EPA-540-R-01-007), June 2001.

This Five-Year Review determines whether the remedy for AOC 1 at NAWC Indianapolis is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review Reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Navy (as Lead Agency at NAWC Indianapolis) is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate as such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."

The Environmental Protection Agency (EPA) interpreted this requirement further in the NCP; 40 CFR § 300.430(f)(4)(ii) states:

"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action "

This is the first Five Year Review for the NAWC Indianapolis. The triggering action for this review is the date of the signature of the remedial decision for Area of Concern (AOC) 1: June 9, 1996. This review is required because there are contaminants remaining at AOC 1, AOC 2, AOC 4, AOC 5, AOC 7, AOC 9,

AOC 10, AOC 15, AOC 16, and AOC 18 above levels that would allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

The following chronology summarizes those remedial actions taken with respect to the contamination found at AOC 1, AOC 2, AOC 4, AOC 5, AOC 7, AOC 9, AOC 10, AOC 15, AOC 16, and AOC 18 at NAWC Indianapolis.

DATE	EVENT
December 1940	US Government acquires 163 acres, formerly used for agriculture.
Spring 1941	Bureau of Ordnance contracts with Lukas-Harold Corp for construction and management of the plant.
May 1942	Facility commissioned as Government Owned – Contractor Operated facility.
November 1942	First Norden Bombsight delivered.
1945	Bureau of Ordnance assumes direct management of control.
1995	Facility is BRAC listed.
March 1996	Environmental Baseline Survey completed.
September 1996	Facility was leased to Hughes Technical Corporation.
December 1997	Raytheon Systems Company purchased facility operation from Hughes.
June 1999	AOC 1 Decision Document signed by Navy, EPA, and IDEM on June 9. (This is the triggering action for the five year review.)
September 1999	Engineering Evaluation / Cost Analysis for the Installation Restoration Site approved by EPA and IDEM. Decision Documents signed by Navy, EPA, and IDEM for AOCs 5, 6, 7, 8, 9, 15, 17, and 18.
January 2000	Action Memorandum for Removal of Contaminated Soils Outside the Heat Treat Area (AOC 10) and Along the Southeast Corner of Sentry Road (AOC 17) approved by EPA and IDEM. Action Memorandum for Removal of Contaminated Soils at the Installation Restoration Site approved by EPA and IDEM.
February 2000	Construction complete (for soil removal) at Installation Restoration Site.
March 2000	Phase I / Phase II Remedial Investigation Report approved by EPA and IDEM. Construction complete (for soil removal) at AOC 10.
April 2000	Parcel 1A transferred to City of Indianapolis. Construction complete (for soil removal) at Sentry Road.
May 2000	Decision Documents signed by Navy, EPA, and IDEM for AOCs 2, 3, 4, 10, 11, 12, 14, and 16.
June 2000	Start of Remedial Design for AOCs 2, 4, 10, and 16.
August 2000	Construction Completion for remedy for AOCs 2, 4, 10, and 16.
December 2000	Revised Decision Document signed by Navy, EPA, and IDEM for AOC 17.

DATE	EVENT
April 2001	Parcel 2A transferred to City of Indianapolis.
June 2001	Decision Document for AOC 10 soils signed by Navy, EPA, and IDEM.
November 2003	Parcel 1B transferred to City of Indianapolis.

3.0 BACKGROUND

Physical Characteristics

NAWC Indianapolis is located in Marion County, east of downtown Indianapolis within a predominantly residential/commercial area. NAWC Indianapolis is bordered by East 21st Street to the north, Arlington Avenue to the west, East 16th Street to the south, and a small waterway, Windsor Branch, to the east. Most of the commercial establishments within the immediate vicinity of NAWC Indianapolis are located along East 21st Street or Arlington Avenue. Businesses in the area include gas stations, car washes, dry cleaners, and office buildings. The areas immediately beyond the businesses lining East 21st and Arlington Avenue are predominantly residential, as are the areas south and east of the NAWC.

Land and Resource Use

The Reuse Plan for NAWC Indianapolis as developed by the NAWC Indianapolis Reuse Planning Authority (IRPA) and approved by the City, anticipates continued commercial/industrial usage of all existing buildings and other structures and all undeveloped land areas within NAWC Indianapolis boundaries.

In 2000, the United States Geological Survey (USGS) determined that there were 32 private water supply wells in an area east, southeast, and south of the NAWC. This inventory included neighborhoods in a broad downgradient direction from the NAWC. The USGS reported that verbal information provided by site visits and a review of Marion County Health Department records indicated that at least 18 of the wells were used as drinking water supply, while others were for irrigation. Well depths were known for 19 wells: 10 were screened in the middle aquifer, 3 screened in the deep aquifer, and six in the bedrock aquifer. Note that at NAWC, groundwater contamination has only been identified in the shallow aquifer with very limited migration. In addition, the USGS determined that shallow aquifer zone groundwater eventually migrating off the NAWC discharges to Pleasant Run Creek. The anticipated continued commercial/industrial use of the NAWC combined with the fact that a public water supply is available would preclude use of groundwater as a drinking water source. In addition, Indiana Department of Natural Resources requires that a water well have at least 20 feet of available drawdown and can be

pumped at a minimum of 3 gallons per minute. The shallow aquifer at NAWC does not meet these criteria.

History of Contamination

Materials (including some hazardous materials and/or petroleum products) have been stored or handled at some of the subject facilities/properties at NAWC Indianapolis, likely resulting in environmental contamination. A detailed list of the hazardous materials and wastes known to be present or to have been present at each building or facility is provided in the Environmental Baseline Survey for Transfer (EBST) document supporting the transfer of each parcel. A brief summary of historical hazardous waste management at NAWC Indianapolis is provided below.

Historically, most of the hazardous materials usage/hazardous waste generation was associated with the metal finishing area in Building 1000 and the painting and potting shops in Building 1200. While small volumes of hazardous materials were stored in the chemical storage cabinets in the vicinity of work stations, most hazardous materials were stored in the chemical storage trailers to the south of Buildings 1000 and 1200. Some hazardous materials or wastes were stored along the exterior walls of Buildings 1000 and 1200.

NAWC Indianapolis has historically disposed of hazardous wastes off site through private contractors. Storage of process wastewater in surface impoundments and on-site landfilling of solid waste is not known to have occurred at NAWC Indianapolis. The facility has always sought to comply with all applicable hazardous waste disposal regulations.

NAWC Indianapolis (currently operated by Raytheon) is considered a large-quantity generator of hazardous waste because it produces in excess of the 2,200-pound Resource Conservation and Recovery Act (RCRA) threshold of hazardous waste per calendar month. NAWC Indianapolis is not a treatment, storage, or disposal (TSD) facility and therefore is only allowed to accumulate hazardous waste at the facility for up to 90 days. However, there is (are) currently no major, centralized waste storage area(s) at NAWC Indianapolis. Hazardous wastes are temporarily staged at satellite accumulation areas throughout the facility and transported/disposed off-site by a private waste contractor on a weekly basis.

Initial Response

No evidence of new releases of hazardous substances or petroleum products above reportable quantities has been documented at NAWC Indianapolis since the Visual Site Inspections (VSIs) conducted in 1998 for the Parcel 1A EBST were completed.

See Table 3-1 for a summary of the Remedial Investigation conclusions from the March 2000 Phase I and Phase II Remedial Investigation Report. Note that the table does not reflect subsequent improvements resulting from soil removal actions discussed in the following paragraph.

Basis for Taking Action

Based on Remedial Investigation results, soils removal at three sites has occurred: The IR Site (January 2000), an area outside the Building 1000 Heat Treat Area (March 2000), and the portion of Sentry Road in the southeast portion of the NAWC (April 2000). Some contamination remains at other AOCs, as detailed in Section 4.0.

4.0 REMEDIAL ACTIONS

Remedy Implementation

Eighteen (18) Areas of Concern and one (1) Installation Restoration site (IR Site) have been identified at NAWC Indianapolis. Remedial actions specified for each AOC are presented in the following tables. Eight (8) AOCs required no remedial action. For six (6) additional AOCs, Land Use Controls were selected as the preferred remedy, while for the final four (4) AOCs, a combination of hydrogen release compound (HRC injection) and Land Use Controls were selected. The HRC is designed to accelerate naturally occurring natural attenuation by increasing the level of microbial activity. In June 2000, onsite design of the HRC injection compound remedy was initiated. In August 2000, the onsite construction was completed at AOC 2, AOC 4, AOC 10, and AOC 16. No remedy has been selected for the IR Site.

The following table defines the AOCs and IR Site addressed by this Five Year Review.

IDENTIFICATION OF NAWC INDIANAPOLIS AOCs AND IR SITE		
AOC	Name	Decision Document Signature Date
1	Former Plating Area, Building 1000	June 9, 1999
2	New Plating Area – Building 1200	May 5, 2000
3	Building 1200	May 5, 2000
4	East Dock	May 5, 2000
5	North – South Sanitary Sewer	Sept. 2, 1999
6	Building 2000 Photography Laboratory	Sept. 2, 1999
7	East – West Storm Sewer	Sept. 2, 1999
8	Former Vehicle Maintenance Facility, Building 4000	Sept. 2, 1999
9	Northwest Corner of Building 3000	Sept. 2, 1999
10	Heat Treat Area – Building 1000	May 5, 2000
11	Miscellaneous Storage Areas South and East of Gate 19	May 5, 2000
12	Contractor Storage Area	May 5, 2000
13	Outdoor Storage Areas South and East of the Public Works Paint Shop (Building 9400)	May 5, 2000
14	Former Document Burn Area	May 5, 2000
15	Building 1100	May 5, 2000
16	Experimental Plating Area – Building 5000	May 5, 2000
17	Sentry Road	Nov. 30, 2000
18	Northeast Land Scar Area	Sept. 2, 1999
IR Site	Former Waste Oil and Coolant Pit	Pending

There were no remaining risks and therefore No Further Action (NFA) determinations were made in connection with the following AOCs at the NAWC. These AOCs are not covered under this report:

AREAS OF CONCERN WHERE NO FURTHER ACTION WAS THE SELECTED REMEDY	
AOC	Name
3	Building 1200
6	Building 2000 Photography Laboratory
8	Former Vehicle Maintenance Facility, Building 4000
11	Miscellaneous Storage Areas South and East of Gate 19
12	Contractor Storage Area
13	Outdoor Storage Areas South and East of the Public Works Paint Shop (Building 9400)
14	Former Document Burn Area
17	Sentry Road

The following remedial action objectives were specified for the AOCs addressed in this report. To date, no remedy has been selected for the IR Site:

REMEDIAL ACTION OBJECTIVES										
	AOC 1	AOC 2	AOC 4	AOC 5	AOC 7	AOC 9	AOC 10	AOC 15	AOC 16	AOC 18
Maintain low level of risk by controlling the site for non-residential uses.	X			X	X	X		X		X
Protect public health by reducing contaminants in groundwater to remediation levels.		X	X				X		X	
Prevent the horizontal migration of contamination beyond the inner fence line.		X	X				X		X	

To support the Remedial Action Objectives stated in each AOCs CERCLA Decision Document, Land Use Controls (LUC) were selected as the remedy for the following AOCs:

AREAS OF CONCERN WHERE LAND USE CONTROLS ARE THE SELECTED REMEDY		
AOC	Name	Condition Requiring Remedy
1	Former Plating Area, Building 1000 (groundwater)	trichloroethene (55 µg/l vs. MCL of 5 µg/l) 1,1-DCE (8 µg/l vs. MCL of 7 µg/l)
5	North – South Sanitary Sewer (soil)	antimony (HQ suggests potential threat to wildlife) thallium (SSL exceeded; HQ suggests potential threat to wildlife)
7	East – West Storm Sewer (soil)	thallium (SSL exceeded; HQ suggests potential threat to wildlife)
9	Northwest Corner of Building 3000 (soil)	benzo-a-anthracene (730 µg/l vs. Region IX PRG of 560 µg/l) benzo-a-pyrene (470 µg/l vs. Region IX PRG of 56 µg/l) benzo-b-fluoranthene (679 µg/l vs. Region IX PRG of 560 µg/l)
15	Building 1100 (soil)	benzo-a-pyrene (exceeded only residential criteria) lead (exceeded only residential criteria)
18	Northeast Land Scar Area (soil)	thallium (SSL exceeded) di-n-butyl phthalate (selected as COPC only because there was no screening level)

The specific LUCs chosen for each AOC are illustrated in the following table:

MATRIX OF APPLICABLE LAND USE CONTROLS BY AOC										
	AOC 1	AOC 2	AOC 4	AOC 5	AOC 7	AOC 9	AOC 10	AOC 15	AOC 16	AOC 18
Prohibition against residential or residential-like uses of the property without prior authorization from the Navy.	X	X	X	X	X	X	X	X	X	X
Prohibition against the extraction or usage of groundwaters from the shallow and middle aquifers underlying the NAWC property.	X	X	X				X		X	
Requirement for the timely restoration of the concrete floor in Building 1000 should any future owner or tenant of the building choose to remove any portion of such flooring. All removals, repairs, or demolition of such flooring will have to be performed in accordance with all Federal, State, and local human health and safety and environmental requirements.	X									
Requirement for annual compliance reporting by the future owner(s) of the NAWC property of the fact that only industrial uses of the property have been allowed and that no groundwater from other than the shallow and middle aquifer has been extracted or used without prior written authorization from the Navy.	X			X	X	X		X		X
Requirement retaining the rights of access by the Navy and Federal and state for environmental investigations, inspections, and/or remedial actions		X	X				X		X	

The remedy for the remaining four AOCs required Hydrogen Release Compound (HRC) to be injected to accelerate natural attenuation of groundwater contamination:

AREAS OF CONCERN WHERE HRC AND LUC IS THE SELECTED REMEDY			
AOC	Name	Main Groundwater Contaminant Driving the Remedy Selection	Basis of Remediation Level
2	New Plating Area – Building 1200	1,1,1-TCA (920 µg/l vs. remediation level of 200 µg/l) 1,1-DCE (76 µg/l vs. remediation level of 7 µg/l)	Federal MCL Federal MCL
4	East Dock	acetone (1700 µg/l vs. remediation level of 610 µg/l) chloromethane (25 µg/l vs. remediation level of 1.5 µg/l) 1,1-DCE (55 µg/l vs. remediation level of 7 µg/l) TCE (11 µg/l vs. remediation level of 5 µg/l)	USEPA Region IX Preliminary Remedial Goal (PRG), Tap Water USEPA Region IX Preliminary Remedial Goal (PRG), Tap Water Federal MCL Federal MCL
10	Heat Treat Area – Building 1000	cis 1,2-DCE (86 µg/l vs. remediation level of 70 µg/l) vinyl chloride (14 µg/l vs. remediation level of 2 µg/l) manganese (7410 µg/l vs. remediation level of 1700 µg/l)	Federal MCL Federal MCL USEPA Region IX Preliminary Remedial Goal (PRG), Tap Water
16	Experimental Plating Area – Building 5000	1,1-DCE (10 µg/l vs. remediation level of 7 µg/l)	Federal MCL

NAWC environmental affairs are overseen by the Base Realignment and Closure (BRAC) Cleanup Team (BCT). The BCT consists of representatives from the Navy, US Environmental Protection Agency (EPA), and Indiana Department of Environmental Management (IDEM).

Regular quarterly groundwater monitoring commenced following construction completion (the injection of the HRC compound) until July 2002 when the BCT agreed to update the site specific groundwater risk assessment to determine if unacceptable risk remained. The BCT agreed to review the risk assessment because while contaminant concentrations clearly decreased to meet remedial goals in some locations (AOC 4 south, AOC 10, and AOC 16), concentrations at AOC 2 and AOC 4 north did not significantly improve. This is attributed to a combination of well known tight geologic clay soil formation and impermeable structures and pavements which result in the inhibited ability of the HRC material to spread horizontally and interact with soil microbes. The Navy completed the risk assessment in December 2002. In June 2003, IDEM's contractor indicated to IDEM that the Navy's risk assessment's conclusions were acceptable. EPA had previously deferred review of the risk assessment to IDEM. In September 2003, the Navy replied to IDEM to address some minor outstanding technical issues identified by IDEM's contractor. On January 20, 2004, IDEM replied with additional comments on the Navy's responses. The

Navy responded to these issues on February 6 and anticipates reaching concurrence and being able to finalize the risk assessment in the near future.

An Engineering Evaluation/Cost Assessment (EE/CA) (September 1999) followed by an Action Memorandum (January 2000) provided for an extensive soils excavation at the IR Site. However, following the soil excavation, neither the final soil remedy or groundwater remedy has been selected to date for the IR Site. Following construction completion, four quarters of groundwater monitoring, plus several supplemental data points, were collected through January 2002. The results were presented and discussed in a June 2002 Technical Memorandum. The BCT agreed to review updated soil and groundwater risk assessment results based on the year of monitoring following construction completion. This IR Site risk assessment has been consolidated into the same document addressing the AOCs groundwater risk assessment currently being reviewed by the BCT. Utilizing extremely conservative exposure assumptions detailed in the technical memorandum, the Navy has concluded that the generally inaccessible remaining soils contamination does not require further remediation provided Land Use Controls are implemented. As indicated above, the BCT has generally agreed on the risk assessment's conclusions. If the BCT finalizes agreement on the risk assessment, the likely remedy for IR Site soil and groundwater will be Land Use Controls.

No additional media sampling has occurred since July 2002 as the BCT evaluates the risk assessment solutions.

System Operations/O&M

There are no Operation and Maintenance (O&M) functions associated with these remedial activities.

5.0 PROGRESS SINCE THE LAST FIVE YEAR REVIEW

This is the first Five Year Review for AOC 1, AOC 2, AOC 4, AOC 5, AOC 7, AOC 9, AOC 10, AOC 15, AOC 16, and AOC 18 at NAWC Indianapolis. Although the remedy selection date for AOC 1 is driving the requirement to complete this Five Year Review, all AOCs and the IR Site are being included. Because no remedy has been selected at the IR site, it will be addressed under the next Five Year Review.

6.0 FIVE YEAR REVIEW PROCESS

The NAWC Indianapolis Restoration Advisory Board (RAB) was notified by mail of the Navy's intent to develop this Five Year Review Report. A public notice that the Five Year Review was being conducted was published on April 24, 2004 in the Indianapolis Star.

The draft Five Year Review Report was provided to EPA and IDEM for review and comment on March 22, 2004. The EPA and IDEM provided comments and proposed revisions by May 5, 2004. Comments from EPA and IDEM were then addressed and resolved.

This document has been available for public review throughout the process. No public comments were received. The Navy will sign the document by June 9, 2004. EPA and IDEM are expected to provide concurrence letters in support of the Navy's conclusions following the Navy's signing the document.

To prepare this Five Year Review, the following documents were reviewed:

- Decision Document for AOC 1 – Former Plating Area, Building 1000 – May 1999.
- Decision Documents for Parcel 1 – July 1999.
- Hydrogeology, Groundwater Flow, and Groundwater Quality at the Naval Air Warfare Center, Indianapolis – October 1999.
- Action Memorandum for the Removal of Contaminated Soils at the Installation Restoration Site – January 2000.
- Action Memorandum for the Removal of Contaminated Soils Outside the Heat Treat Area and Along the Southeast Corner of Sentry Road – January 2000
- Phase I and Phase II Remedial Investigation Report – March 2000
- Decision Documents for AOCs 2, 3, 4, 10, 11, 12, 13, 14, and 16 – April 2000

- Decision Document for AOC 17 – December 2000.
- Post Remediation Technical Memorandum (draft) – June 2002

Data reviewed included the seven quarterly samples of groundwater quality for AOCs 2, 4, 10, and 16, and the four quarterly groundwater samples of groundwater quality for the IR Site. These AOCs were subject to HRC treatment but review of trends indicated mixed levels of effectiveness (see Section 4). In addition, several supplemental data points were collected to support a risk assessment of the groundwater quality which the BCT is currently reviewing.

Because the NAWC Indianapolis facility continues in operation (operated by Raytheon), a formal inspection was not required. Ongoing plant operations ensure that no residential activities, monitoring well installation or groundwater extraction activities can occur. In addition, since the Navy has not yet transferred the final parcel, frequent Navy site visits continue.

Interviews were not conducted. Because NAWC is a fenced operating plant with controlled access, particularly to the inner fenced area where contaminated groundwater is present, limited access is already guaranteed. There have not been any issues associated with the implementation of Institutional Controls.

There are no unusual situations or problems at this site.

7.0 TECHNICAL ASSESSMENT

Question A: Is the remedy functioning as intended by the decision documents?

The LUC component of the remedy for AOC 1, AOC 2, AOC 4, AOC 5, AOC 7, AOC 9, AOC 10, AOC 15, AOC 16, and AOC 18 is functioning as intended by the decision documents. The remedial action decision date for AOC 1 is driving this Five Year Review, and the AOC 1 remedy is LUC only. However, by BCT agreement this Five Year Review is addressing the entire NAWC. Therefore, it is necessary to note that the HRC injection at AOC 2, 4, 10, and 16 is not functioning as intended. More specifically, to date the natural attenuation anticipated by HRC injection is not uniformly occurring at the rate anticipated. AOC 16 remedy has yet been selected for the IR Site. Groundwater sampling to date continues to confirm that contaminated groundwater is being contained at all AOCs and the IR Site.

The BCT is currently evaluating an updated risk assessment based on the remedial action monitoring and will be evaluating whether unacceptable risk remains.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

For AOC 1 which is driving this Five Year Review, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid. Land use expectations have not changed. No human health or ecologic routes of exposure or receptors have changed. There are no newly identified contaminants or contaminant sources. No toxic byproducts have been identified or are expected.

For the other AOCs, the toxicity data, cleanup levels and remedial action objectives used at the time of the remedy selection are still valid. Land use expectations have not changed. No human health or ecologic routes of exposure or receptors have changed. There are no newly identified contaminants or contaminant sources. No toxic byproducts have been identified or are expected.

The understanding of physical site conditions has changed in that it has become apparent that the injected HRC material (AOCs 2, 4, 10, and 16) does not migrate efficiently through the shallow aquifer. At some locations, this is attributed to pavement and structures which prevent precipitation percolation effectively inducing the HRC distribution. In addition, an updated analysis of the potential use of shallow groundwater as drinking water has indicated that it would be illegal per the Marion County Health Department to install a drinking water well at this depth horizon (see Section 3) based on restrictive groundwater yield.

An updated risk assessment, incorporating the restrictive groundwater yield from the shallow depth zone, is currently being reviewed by the BCT. EPA has agreed to defer to IDEM in review of the risk assessment, and IDEM has already agreed in principal with the risk assessment results and conclusions for revising the remedy for AOC 2, AOC 4, AOC 10, and AOC 16 to LUC only.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new information beyond that previously discussed in response to Question B has come to light that could call into question the protectiveness of the remedy. While the rate of groundwater contamination mitigation is less than desired, groundwater remains effectively contained.

There are no newly identified ecologic risks. There are no impacts from natural disasters.

8.0 ISSUES

There are no issues preventing the remedy at all AOCs from being protective. LUCs ensure that there is no contact with groundwater contamination. The confirmation that groundwater contamination is not migrating contributes to the overall protectiveness.

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The Navy recommends the following:

- The LUC remedy should remain in place for AOC 1, AOC 9, and AOC 15, where LUC have been selected as the remedy.
- The remedies for AOC 5 and 7 should be changed to No Further Action from LUCs. Only thallium (AOC 5) and antimony (AOC 5 and 7) exceeded action levels, but both of these contaminants are present at concentrations that only slightly exceed background values. Both were selected as COPCs because of potential risk to wildlife and also because thallium exceeded SSLs. SSLs criteria assumes residential use. However, the City of Indianapolis remains committed to keeping the future land use as non-residential, resulting in little potential for wildlife to establish habitat. Per the agreed ecologic risk assessment methodology, the degree to which wildlife are expected to use the area is a factor in remedy selection. In addition, the deed and/or EBST/FOSTs (as applicable) for each parcel require continued non-residential use. The continued commitment of the City of Indianapolis to maintain this land use, plus the redundancy provided by the deed and/or EBST/FOST restrictions, supports the remedy change.
- The remedy for AOC 18 should be changed to No Further Action from LUC. While thallium and di-n-butyl phthalate exceeded action levels, those concentrations are below background concentrations, and di-n-butyl phthalate lacks an ecologic screening level – defaulting it to COPC selection. While the SSLs assumes residential use, since AOC 18 has been deed transferred to the City of Indianapolis, the City remains obligated to enforcing the future land use as non-residential per deed restriction, resulting in little potential for wildlife to establish habitat. Based on agreed ecologic risk assessment methodology, the degree to which wildlife are expected to use the area is a factor in remedy selection. The continued commitment of the City of Indianapolis to maintain the non-

residential land use, plus the redundancy provided by the deed restriction, supports the remedy change.

- The groundwater remedy should be changed to LUCs for groundwater at AOCs 2, 4, 10 and 16 based on the ambiguous HRC effectiveness, low contaminant loading, effective containment, Marion County Health Department prohibition on well installations, and updated risk assessment.
- Groundwater sampling at AOCs 2, 4, 10, and 16 be conducted to support the next Five Year Review, particularly if the remedy is changed to LUCs.
- The Navy's anticipated schedule for implementation of the remedy revisions identified above is for the activities to be complete by September 30, 2004. The schedule for implementation of groundwater sampling to support the next Five year Review should support time to review, validate, and assess the data in time to incorporate the evaluation in the next Five Year Review. Therefore, a tentative date (to be confirmed closer to the Five Year Review due date) would be to have the groundwater sampling complete by March 31, 2009.

10.0 PROTECTIVENESS STATEMENT

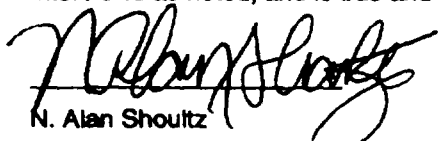
Because the remedial actions at all AOCs are protective, the Site is protective of human health and the environment.

11.0 NEXT REVIEW

The second Five Year Review will be required by June 9, 2009. The second Five Year Review will also address all the AOCs and the IR Site.

12.0 CERTIFICATION

I certify that the information stated in this report is based on a review of records, visual inspection, and interviews as noted, and is true and correct to the best of my knowledge and belief.



N. Alan Shultz

Environmental Engineer

TABLE 3-1

RISK ASSESSMENT SUMMARY
 PHASE II REMEDIAL INVESTIGATION
 NAVAL AIR WARFARE CENTER INDIANAPOLIS
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Area of Concern	Types of Material/Wastes	Chemicals of Potential Concern			Risk Estimates					Recommendations
		Soil			Receptor	CR	Major Chemicals (1)	HI	Major Chemicals (2)	
		Industrial	Residential	Protective of Groundwater	Construction Worker					
The Installation Restoration Site The Former Waste Oil and Coolant Pit	This unit once functioned as an oil water separator. The unit was also used as a holding tank for water soluble machine coolant oil.	1,1-Dichloroethene 1,2-Dichloroethene (total) Carbon Tetrachloride Chloroform Methylene chloride Tetrachloroethene Trichloroethene Vinyl Chloride Benzo(a)pyrene Benzo(b)fluoranthene Aroclor 1254 Chromium	1,1,1-Trichloroethene 1,1-Dichloroethene 1,2-Dichloroethene (total) Carbon Tetrachloride Chloroform Methylene Chloride Tetrachloroethene Trichloroethene Vinyl chloride Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(b)fluoranthene Dibenzo(a,h)anthracene Indeno(1,2,3-cd)pyrene Aroclor 1254 Antimony Chromium Copper	1,1-Dichloroethene 1,2-Dichloroethene (total) 1,1,1-Trichloroethane Chloroform Methylene chloride Tetrachloroethene Trichloroethene Vinyl chloride Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Hexachloroethane Indeno(1,2,3-cd)pyrene Nitrobenzene Pentachlorophenol Aroclor 1254 Antimony Chromium	Soil	3.8E-05	Carbon Tetrachloride Tetrachloroethene Trichloroethene Vinyl Chloride	15	Carbon Tetrachloride Chloroform Tetrachloroethene	Risk analysis performed assuming future industrial commercial land use scenario. Hazard indices for construction workers exposed to soil exceed acceptable levels. Nature and extent of contamination has been defined. Address through FFCA/F feasibility Process.
					Groundwater	6.9E-05	Aroclor 1254 Bis(2-ethylhexyl)phthalate Carbon Tetrachloride Tetrachloroethene Trichloroethene Vinyl Chloride	725	Aroclor 1254 Bis(2-ethylhexyl)phthalate Carbon Tetrachloride Chloroform Tetrachloroethene Trichloroethene	
					Typical Worker					
					Soil	3.3E-05	1,1-Dichloroethene Aroclor 1254 Benzo(a)pyrene Tetrachloroethene Trichloroethene Vinyl Chloride	0.58		
					Vapor Intrusion	8.8E-04	1,1-Dichloroethene 1,2-Dichloroethene Benzene Carbon Tetrachloride Chloroform Tetrachloroethene Trichloroethene Vinyl Chloride	85	Carbon Tetrachloride Chloroform	
					Adolescent Trespasser					
					Soil	1.8E-06		0.15		
					Potable Groundwater Use	4.1E-01	1,1,2-Trichloroethane 1,1-Dichloroethene 1,2-Dichloroethene Benzene Carbon tetrachloride Chloroform Methylene Chloride Tetrachloroethene Trichloroethene Vinyl chloride Bis(2-ethylhexyl)phthalate Chrysene Pentachlorophenol Arsenic Beryllium	581	1,1,1-Trichloroethane 1,1-Dichloroethene cis-1,2-Dichloroethene trans-1,2-Dichloroethene (total) 2-Butanone 4-Methyl-2-pentanone Acetone Toluene Xylenes, total Naphthalene Aroclor 1254 Aluminum Antimony Cadmium Chromium Copper Manganese Nickel Vanadium	
		1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,1-Dichloroethane 1,1-Dichloroethene 1,2-Dichloroethane cis-1,2-Dichloroethene trans-1,2-Dichloroethene 1,2-Dichloroethene (total) 2-Butanone 2-Methyl-2-pentanone Acetone Benzene Carbon tetrachloride Chloroform Ethylbenzene	Methylene Chloride Tetrachloroethene Toluene Trichloroethene Vinyl chloride Xylenes, total 2-Methylphenol 4-Methylphenol Bis(2-ethylhexyl)phthalate Chrysene Naphthalene Pentachlorophenol Phenanthrene Aroclor 1254 Aluminum	Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Manganese Nickel Silver Vanadium Zinc						

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NAVAL AIR WARFARE CENTER INDIANAPOLIS
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Area of Concern	Types of Material/Wastes	Chemicals of Potential Concern			Risk Estimates					Recommendations
		Industrial	Residential	Protective of Groundwater	Receptor	CR	Major Chemicals (1)	HI	Major Chemicals (2)	
AOC 1 The Former Plating Area, Building 1000	The plating operation was justly located in this area. Plating solutions and degreasers were discharged to the sanitary sewers in this area. Heavy metal plating solutions, cyanide based plating solutions, and a chlorinated solvent degreaser were used in this area.	None	Antimony	Antimony	No COPCs were identified for this AOC for the expected land use, consequently, no risks were calculated.	NA		NA		Risk analysis performed assuming future industrial commercial land use scenario. No COPCs were identified for a nonresidential land use scenario, therefore potential risks to the identified receptor groups are within acceptable levels. No further action is recommended for this site (3). A Decision Document has been prepared for AOC 1.
					Potable Groundwater Use	NA		0.4		
AOC 2 The New Plating Area, Building 1200	The plating operation in Building 1200 began in 1965. Plating solutions and rinses were discharged to the sanitary sewers in this area. Heavy metal plating solutions, cyanide-based plating solutions, and a chlorinated solvent degreaser were used in this area.	None	Cadmium Thallium	Pentachlorophenyl Chromium Thallium	Construction Worker Groundwater	1.1E-09		0.05		Risk analysis performed assuming future industrial commercial land use scenario. Cancer risks and hazard indices for the identified receptor groups are within acceptable levels. No further action is recommended for site soils. Groundwater remedies will be evaluated in the Feasibility Study.
					Typical Worker Vapor Intrusion	1.4E-07		0.01		
		cis-1,2-Dichloroethane 1,1,1-Trichloroethane 1,1-Dichloroethene	Chloroform Vinyl chloride	Antimony Manganese Thallium	Potable Groundwater Use	1.7E-03	1,1-Dichloroethane Chloroform Vinyl chloride	4.0	1,1,1-Trichloroethane Thallium	
AOC 3 Building 1200, except the Plating Area	The printed wire board shop, new painting area, the Roto Burr unit, and environmental testing area (s) located in this area. Printed wire board used process chemicals similar to the plating area.	None	Aroclor 1260 Copper	None	Construction Worker Groundwater	1.8E-09		0.0002		Risk analysis performed assuming future industrial commercial land use scenario. Cancer risks and hazard indices for the identified receptor groups are within acceptable levels. No further action is recommended for site soils. Groundwater remedies will be evaluated in the Feasibility Study.
					Typical Workers Vapor Intrusion	1.0E-07		0.000004		
		1,1-Dichloroethene Methylene Chloride	Aluminum	Manganese	Potable Groundwater Use	4.4E-05	1,1-Dichloroethene Methylene Chloride	1.5	Manganese	
AOC 4 The East/West Disposal and Outdoor Storage Areas, Buildings 1000-1200	Historically or currently used as outdoor storage or staging areas for process chemicals or wastes.	1,1-Dichloroethene Benz(a)pyrene	1,1-Dichloroethane Benz(a)anthracene Benz(a)pyrene Benz(b)fluoranthene Indeno(1,2,3-cd)pyrene Antimony Beryllium Cadmium Copper Manganese Thallium Vanadium	1,1,1-Trichloroethane 1,1-Dichloroethene Tetrachloroethane Trichloroethene Benz(a)anthracene Benz(a)pyrene Benz(b)fluoranthene Bis(2-chloroethyl)ether Carbazole Antimony Beryllium Cadmium Selenium Thallium	Construction Worker Soil	3.5E-07		0.002		Risk analysis performed assuming future industrial commercial land use scenario. Cancer risks and hazard indices for the identified receptor groups are within acceptable levels. No further action is recommended for site soils. Groundwater remedies will be evaluated in the Feasibility Study.
					Groundwater	4.4E-08		0.02		
					Typical Worker					
					Vapor Intrusion	5.3E-06	1,1-Dichloroethene	0.02		
					Adolescent Trespasser Soil	1.5E-07		0.02		
					Potable Groundwater Use	1.2E-03	1,1-Dichloroethene Chloroform Chloromethane Trichloroethene	4.1	Acetone	
		Acetone 1,1,1-Trichloroethane 1,1-Dichloroethene	Chloroform Chloromethane	Trichloroethene Manganese						

TABLE 3-1
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Area of Concern	Types of Material/Wastes	Chemicals of Potential Concern			Risk Estimates					Recommendations
		Industrial	Residential	Protective of Groundwater	Receptor	CR	Major Chemicals (1)	HI	Major Chemicals (2)	
AOC 5 Main North-South Sanitary Sewer (plus 6 inches Building 1200)	plating solutions nitrate plating rinses historically drained to the sanitary from current and plating areas.	None	None	Thallium	No COPCs were identified for this AOC; consequently, no risks were calculated.					No direct contact COPCs were identified for soils. No quantitative risk assessment necessary. Thallium was the only COPC selected based on a comparison of soil concentrations to SSLs for the protection of groundwater. However, the thallium concentrations detected in soil may reflect background conditions. No further action is recommended for this site. (3) A Decision Document has been prepared for AOC 5.
AOC 6 The Building 2000 Photo Lab	The photo lab discharged silver laden photography fixer solution to the sanitary sewer prior to the late 1970's or 1980's	No soil or groundwater samples were collected at this site.			No COPCs were identified for this AOC; consequently, no risks were calculated.					A review of construction drawings indicated that no process sumps, floor drains, trenches, or access points to the floor exist in the immediate vicinity of AOC 6. Hydrostatic testing prior to tie-in to the Building 2000 main sewer was possible. No sampling or quantitative risk assessment performed or justifiable. No further action is recommended for this site. A Decision Document has been prepared for AOC 6.
AOC 7 East-West Storm Sewer	The main east-west storm sewer had a history of carrying minor non-storm discharges through sewer lines.	Industrial	Residential	Protective of Groundwater	No COPCs were identified for this AOC; consequently, no risks were calculated.					No direct contact COPCs were identified for soils. No quantitative risk assessment necessary. Thallium was the only COPC selected based on a comparison of soil concentrations to SSLs for the protection of groundwater. However, the thallium concentrations detected in soil may reflect background conditions. No further action is recommended for this site. (3) A Decision Document has been prepared for AOC 7.
AOC 8 Building 4000 Former Vehicle Maintenance Garage	Petroleum based products and waste products	Industrial	Residential	Protective of Groundwater	No COPCs were identified for this AOC; consequently, no risks were calculated.					No direct contact COPCs were identified for soils. Additionally, chemical concentrations in the soil were less than SSLs developed for groundwater protection. No further action is recommended for this site. A Decision Document has been prepared for AOC 8.

TABLE 3-1

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Area of Concern	Types of Material/Wastes	Chemicals of Potential Concern			Risk Estimates					Recommendations
		Industrial	Residential	Protective of Groundwater	Receptor	CR	Major Chemicals (1)	HI	Major Chemicals (2)	
AOC 9 Northwest Corner of Building 3000 Hydraulic Trash Compactor Area		Soil			Construction Worker	1.8E-07		NA		Risk analysis performed assuming future industrial commercial land use scenario. Cancer risks and hazard indices for the identified receptor groups are within acceptable levels. No further action is recommended for this site (3). A Decision Document has been prepared for AOC 9.
		Benz(a)pyrene	Benz(a)anthracene	Protective of Groundwater	Soil					
			Benz(a)pyrene	2,2-Diethyl-1-chloropropane	Typical Worker	1.7E-06	Benz(a)pyrene	NA		
			Benz(b)fluoranthene	Benz(b)fluoranthene	Soil	2.3E-07		NA		
		Groundwater			Adolescent Trespasser					
		No groundwater samples collected			Soil			NA		
AOC 10 Building 1000 Heat Treat	Building 1000 heat treat area was used to impart the desired metallurgical hardness property on test parts. Cyanide quenches were used in this area. Floor trenches discharged to the sanitary sewer system.	Soil			Construction Worker	2.7E-06	Benz(a)pyrene	NA		Risk analysis performed assuming a future industrial/commercial land use scenario. Cancer risks for a construction worker exposed to soil and groundwater are less than 10 ⁻⁶ . Cancer risks for a typical worker exposed to soil exceed 10 ⁻⁴ . Further action is recommended for AOC 10.
		Benz(a)anthracene	Benz(a)anthracene	Benz(a)anthracene	Soil	1.30E-08		0.004		
		Benz(a)pyrene	Benz(a)pyrene	Benz(a)pyrene	Groundwater					
		Benz(b)fluoranthene	Benz(b)fluoranthene	Benz(b)fluoranthene						
		Indeno(1,2,3-cd)pyrene	Benz(k)fluoranthene	Benz(k)fluoranthene	Typical Worker	1.2E-04	Benz(a)anthracene	NA		
			Dibenz(a,h)anthracene	Carbazole	Soil		Benz(a)pyrene			
			Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene			Benz(b)fluoranthene			
				Indeno(1,2,3-cd)pyrene			Indeno(1,2,3-cd)pyrene			
				Phenanthrene						
		Groundwater			Vapor Intrusion	1.6E-06	Vinyl Chloride	NA		
cis-1,2-dichloroethene	Aluminum	Lead								
Trichloroethene	Antimony	Manganese								
Vinyl chloride	Arsenic			Potable Groundwater Use	9.9E-04	Trichloroethene	6.8	cis-1,2-dichloroethene		
						Vinyl chloride		Manganese		
						Arsenic				
AOC 11 Miscellaneous Storage Areas South and East of Gate 19	Outdoor areas south and east of Gate 19 have been used to receive, store, and stage hazardous materials, sometimes including hazardous waste.	Soil			Construction Worker	2.0E-06	Benz(a)pyrene	NA		Risk analysis performed assuming a future industrial/commercial residential land use scenario. Cancer risks for all receptors are within acceptable levels. No further action is recommended for soil. Groundwater remedies will be evaluated in the Feasibility Study.
		Benz(a)anthracene	Benz(a)anthracene	Protective of Groundwater	Soil	1.1E-08		0.03		
		Benz(a)pyrene	Benz(a)pyrene	1,1,2-Trichloroethane	Groundwater					
		Benz(b)fluoranthene	Benz(b)fluoranthene	Trichloroethene						
		Dibenz(a,h)anthracene	Dibenz(a,h)anthracene	Benz(a)anthracene	Typical Worker	3.7E-05	Benz(a)anthracene	NA		
		Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benz(a)pyrene	Soil		Benz(a)pyrene			
			Indeno(1,2,3-cd)pyrene	Benz(b)fluoranthene			Benz(b)fluoranthene			
			Phenanthrene	Carbazole			Dibenz(a,h)anthracene			
			Antimony	Dibenz(a,h)anthracene			Dibenz(a,h)anthracene			
			Cadmium	Indeno(1,2,3-cd)pyrene			Indeno(1,2,3-cd)pyrene			
			Chromium	Antimony						
		Groundwater - Shallow Aquifer			Vapor Intrusion	6.5E-09		0.003		
		Chloroform	Barium	Lead						
		Bis(2-ethylhexyl)phthalate	Beryllium	Manganese						
		Aluminum	Cadmium	Nickel						
		Antimony	Chromium	Thallium						
		Arsenic	Copper	Vanadium						
Groundwater - Middle Aquifer			On site Resident	4.2E-05	Benz(a)anthracene	0.26				
	Barium		Soil		Benz(a)pyrene					
					Benz(b)fluoranthene					
					Dibenz(a,h)anthracene					
					Indeno(1,2,3-cd)pyrene					
				Vapor Intrusion	2.7E-08		0.04			
				Recreational User	3.9E-06	Benz(a)pyrene	0.01			
				Soil						
				Potable Groundwater Use	2.1E-03	Arsenic	9.1	Aluminum		
				Shallow		Beryllium		Manganese		
								Thallium		
				Middle	2.3E-04	Arsenic	0.19			

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Area of Concern	Types of Material/Wastes	Chemicals of Potential Concern			Risk Estimates					Recommendations
					Receptor	CR	Major Chemicals (1)	HI	Major Chemicals (2)	
AOC 12 Contractor Storage Area	Mechanical equipment and supplies only have been stored in this area	No soil or groundwater samples were collected at this site			No COPCs were identified for this AOC consequently, no risks were calculated					No further action
AOC 13 Outdoor Storage Areas in the vicinity of the Public Works Paint Shop	Outdoor areas to the south and east of the Public Works Paint Shop have been used to receive, store, and stage various materials, including hazardous wastes. The hazardous materials go shed exists in the	Soil			Construction Worker Soil	2.3E-07		0.004		Risk analysis performed assuming a future industrial/commercial/residential land use scenario. Cancer risks and hazard indices for all identified receptor groups are within acceptable levels. No further action is recommended for AOC 13 soils. Groundwater remedies will be evaluated in the Feasibility Study
		Industrial	Residential	Protective of Groundwater	Groundwater	1.6E-10		0.0006		
		Beryllium	Antimony Beryllium Cadmium Chromium Thallium	Antimony Chromium Thallium	Typical Worker Soil	1.1E-06	Beryllium	0.0004		
		1,2-Dichloroethane Chloromethane	Antimony	Manganese	Vapor Intrusion	1.1E-08		0.0007		
					On site Resident Soil	5.5E-06	Beryllium	0.67		
					Vapor Intrusion	4.7E-08		0.01		
					Recreational User Soil	1.8E-07		0.003		
					Potable Groundwater Use	1.9E-05	1,2-Dichloroethane Chloromethane	1.8	Manganese	
AOC 14 The Former Document Burn Area	Small quantities of accelerants may have been burnt at this site	Soil			Construction Worker Soil	6.1E-07		0.08		Risk analysis performed assuming a future industrial/commercial/residential land use scenario. Cancer risks and hazard indices for all identified receptor groups are within acceptable levels. No further action is recommended for AOC 14 soils. Groundwater remedies will be evaluated in the Feasibility Study
		Industrial	Residential	Protective of Groundwater	Groundwater	7.7E-10		0.0007		
		Benzo(a)pyrene Vinyl Chloride	1,2-Dichloroethane (total) Tetrachloroethene Trichloroethene Vinyl Chloride Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Bis(2-Ethylhexyl)phthalate Indeno(1,2,3-cd)pyrene Antimony Copper Thallium	Benzene Methylene Chloride Tetrachloroethene Trichloroethene Bis(2-Ethylhexyl)phthalate Carbazole Pentachlorophenol Antimony Thallium	Typical Worker Soil	1.1E-06	Benzo(a)pyrene	0.008		
					Groundwater	1.2E-11		0.00005		
					On site Resident Soil	7.0E-06	Benzo(a)pyrene Vinyl Chloride	0.34		
					Vapor Intrusion	4.9E-11		0.00008		
					Recreational User Soil	1.6E-07		0.003		
					Potable Groundwater Use	3.4E-04	Bromodichloromethane Chloroform Arsenic	2.38	Thallium	
		Bromodichloromethane Chloroform Aluminum	Arsenic Lead Manganese	Vanadium						
AOC 15 Building 1100	Building 1100 is a mechanical testing facility. A floor and trench inspection was performed to search for process materials spillage/leakage potential migration to environment	Soil			No COPCs were identified for this AOC consequently, no risks were calculated					Risk analysis performed assuming a future industrial/commercial land use scenario. No COPCs selected assuming future industrial land use scenario. No further action is recommended (3). A Decision Document has been prepared for AOC 15
		Industrial	Residential	Protective of Groundwater						
		None	Benzo(a)pyrene Lead	None						

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Area of Concern	Types of Material/Wastes	Chemicals of Potential Concern			Risk Estimates					Recommendations
		Industrial	Residential	Protective of Groundwater	Receptor	CR	Major Chemicals (1)	HI	Major Chemicals (2)	
AOC 16 The Building 5000 Former Experimental Plating Laboratory	Electrolytic copper, nickel, tin, copper etch, copper cyanide, hexavalent chromium, acid cadmium, and cyanide cadmium were periodically used in some of the operations.	1,1-Dichloroethene	1,1-Dichloroethene	1,1,1-Trichloroethane	Construction Worker	2.4E-07		0.004		Risk analysis performed assuming a future industrial/commercial/residential land use scenario. Cancer risks and hazard indices for all identified receptor groups are within acceptable levels. No further action is recommended for AOC 16 soils. Groundwater remedies will be evaluated in the Feasibility Study.
		Beryllium	Beryllium	1,1-Dichloroethene	Soil					
			Zinc	Trichloroethene	Groundwater	8.6E-09		0.05		
				Beryllium	Typical Worker					
					Vapor Intrusion	1.1E-06		0.07		
		1,1,1-Trichloroethane	1,1-Dichloroethene	Beryllium	Potable Groundwater Use	3.6E-04	1,1-Dichloroethene Chloroform Beryllium	1.35	Manganese	
			Chloroform	Manganese						
AOC 17 Sentry Drive	Petroleum products Sentry Drive may have been spilled over time	Soil - Area A			Area A					For Area A risk analysis performed assuming a future residential or industrial/commercial land use scenario. Cancer risks for the identified receptor groups are within acceptable levels. A Decision Document has been prepared for this section of AOC 17 (4).
		Industrial	Residential	Protective of Groundwater	Construction Worker	1.2E-06	Benzo(a)pyrene	NA		
		Benzo(a)pyrene	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Indeno(1,2,3-cd)pyrene	None	Soil					
					Typical Worker	6.1E-06	Benzo(a)pyrene	NA		
					On-site Resident	3.6E-05	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Indeno(1,2,3-cd)pyrene	NA		
		Soil - Area B			Area B					For Area B, risk analysis performed assuming a future residential or industrial/commercial land use scenario. Cancer risks for construction workers and recreational users are within acceptable levels. Cancer risks for typical workers and on-site residents exceed 10 ⁻⁴ . Further action is recommended for this section of AOC 17.
		Industrial	Residential	Protective of Groundwater	Recreational User	8.6E-07		NA		
		Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Indeno(1,2,3-cd)pyrene Phenanthrene	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Indeno(1,2,3-cd)pyrene Phenanthrene	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Carbazole	Soil					
		Groundwater			Construction Worker	2.1E-05	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene	NA		
		No groundwater samples were collected			Soil					
					Typical Worker	1.0E-04	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Indeno(1,2,3-cd)pyrene	NA		
					On-site Resident	4.4E-04	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Indeno(1,2,3-cd)pyrene	NA		
					Recreational User	1.1E-05	Benzo(a)pyrene Benzo(b)fluoranthene	NA		

TABLE 3-1
RISK ASSESSMENT SUMMARY
PHASE II REMEDIAL INVESTIGATION
NAVAL AIR WARFARE CENTER INDIANAPOLIS
MARION COUNTY, INDIANA
PAGE 7 OF 7

Area of Concern	Types of Material/Wastes	Chemicals of Potential Concern			Receptor	Risk Estimates				Recommendations
		Industrial	Residential	Protective of Groundwater		CR	Major Chemicals (1)	HI	Major Chemicals (2)	
AOC 18 Northeast Land Scar Area	This is an area devoid of vegetation in the northeast corner of the NAWC. No history of chemical usage or disposal. The area may have been a soil borrow area.	Soil			No COPCs were identified for this AOC; consequently, no risks were calculated.					No direct contact COPCs were identified for soils. No quantitative risk assessment necessary. Thallium was the only COPC selected based on a comparison of soil concentrations to SSLs for the protection of groundwater. However, the thallium concentrations detected in soil may reflect background conditions. No further action is recommended for AOC 18.(3). A Decision Document has been prepared for AOC 18.
		None	None	None						
		Groundwater								
		No groundwater samples collected.								
Pleasant Run	The site's storm sewer and sanitary sewer discharge to Pleasant Run.	Sediment			Only a screening analysis was performed for Pleasant Run. No quantitative risks for calculated.					No adverse health effects are anticipated from exposure to surface water/sediments since the screening criteria are based on residential / industrial exposures and actual exposures will be less than those used in development of the screening criteria, no further action is recommended.
		Industrial	Residential							
		Benzo(a)pyrene	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenzo(a,h)anthracene Chromium Manganese							
		Surface Water								
Windsor Branch	Pleasant Run discharges to Windsor Branch.	Bis(2-ethylphthalate)			Only a screening analysis was performed for Windsor Run. No quantitative risks for calculated.					No adverse health effects are anticipated from exposure to surface water/sediments since the screening criteria are based on residential / industrial exposures and actual exposures will be less than those used in development of the screening criteria, no further action is recommended.
		Sediment								
		Industrial	Residential							
		Arsenic	Benzo(a)pyrene Arsenic Manganese							
		Surface Water								
		Lead	Manganese							

Notes:

1. Chemicals with a cancer risk greater than 1E-06

2. Chemicals with a hazard index greater than 1.0

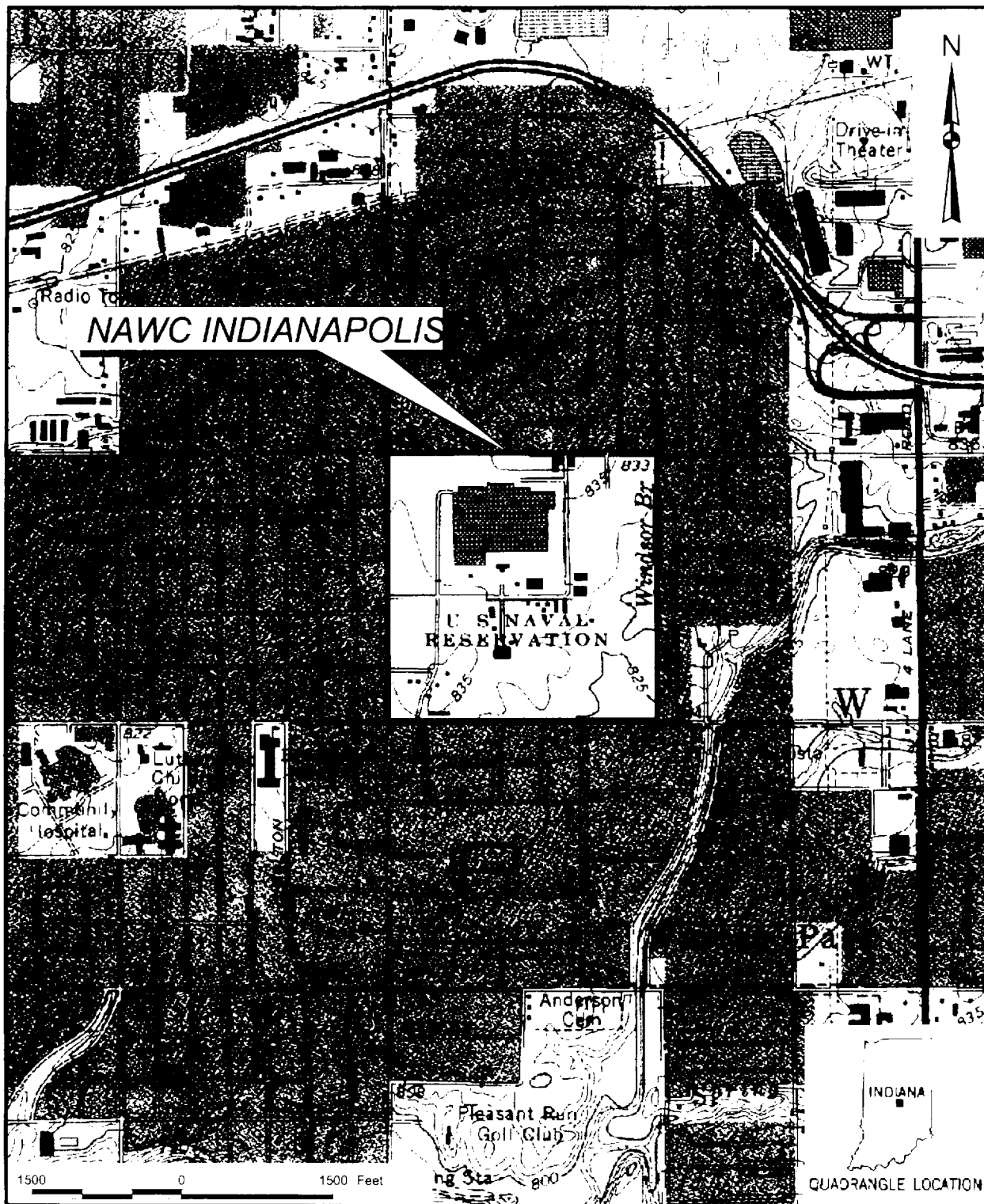
3. Institutional controls have been specified in the Decision Document prepared for this AOC.


NA: No toxicity values were available for noncarcinogenic compounds consequently a hazard index could not be calculated.

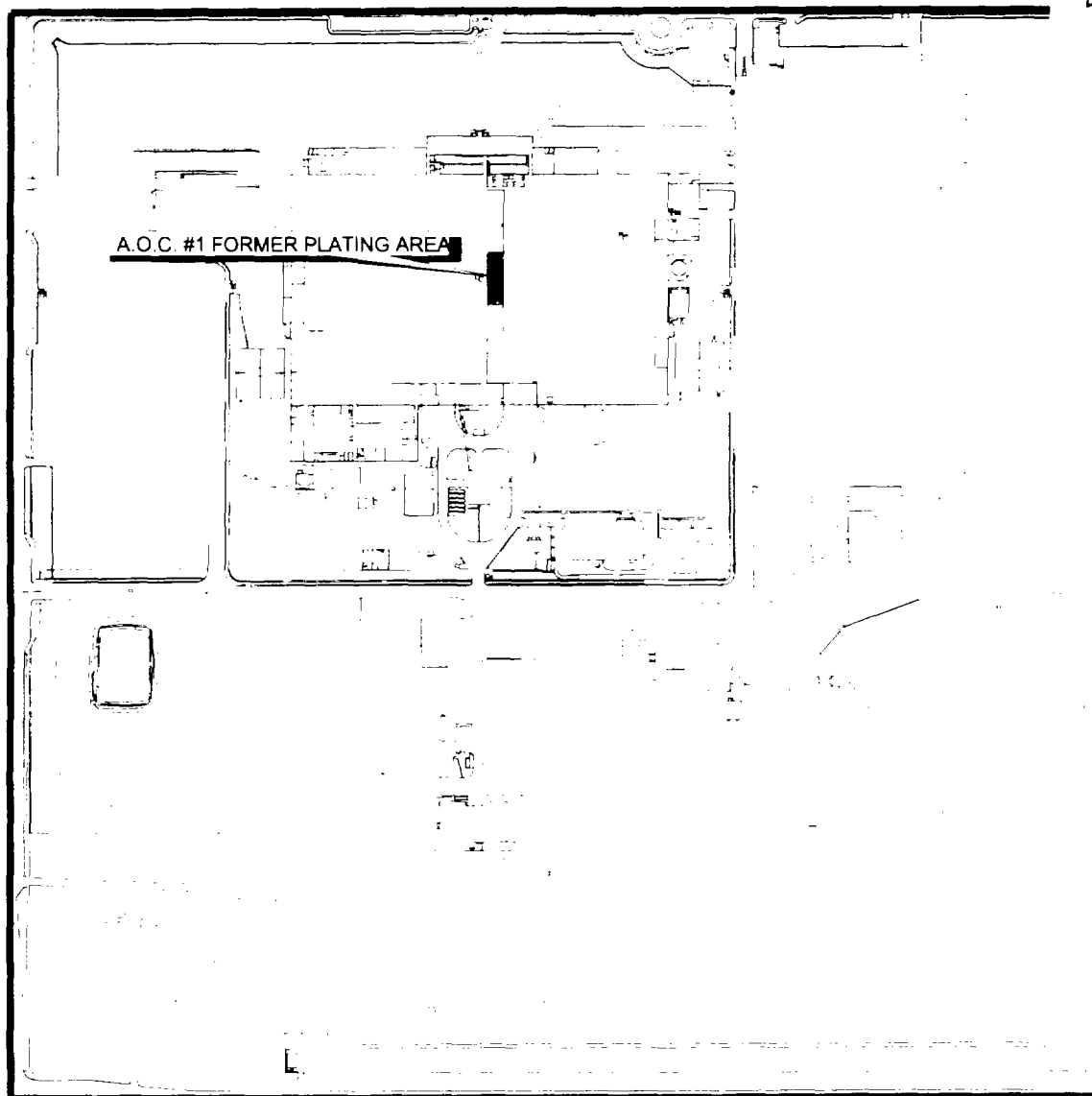
CR: Cancer Risk

HI: Hazard Index

SOURCE: BASEMAP IS A PORTION OF THE USGS INDIANAPOLIS EAST 15-MINUTE SERIES, 1967, PHOTO-REVISED 1980.



DRAWN BY D. PERRY		CONTRACT NUMBER	
CHECKED BY M. SLADIC		APPROVED BY _____ DATE _____	
COST/SCHEDULE AREA		APPROVED BY _____ DATE _____	
STATE AS NOTED		DRAWING NO. FIGURE 3-1	
		REV. 0	



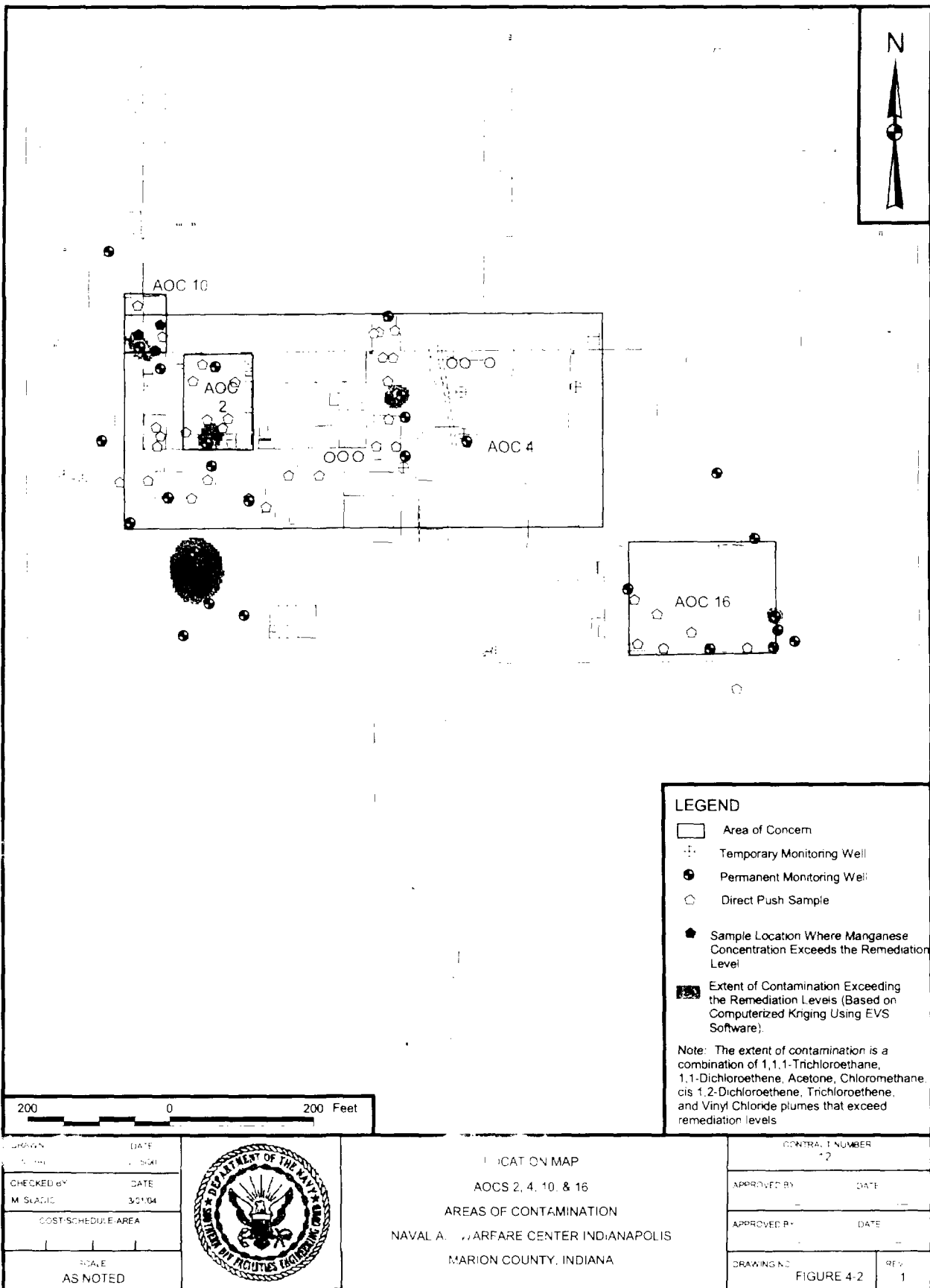
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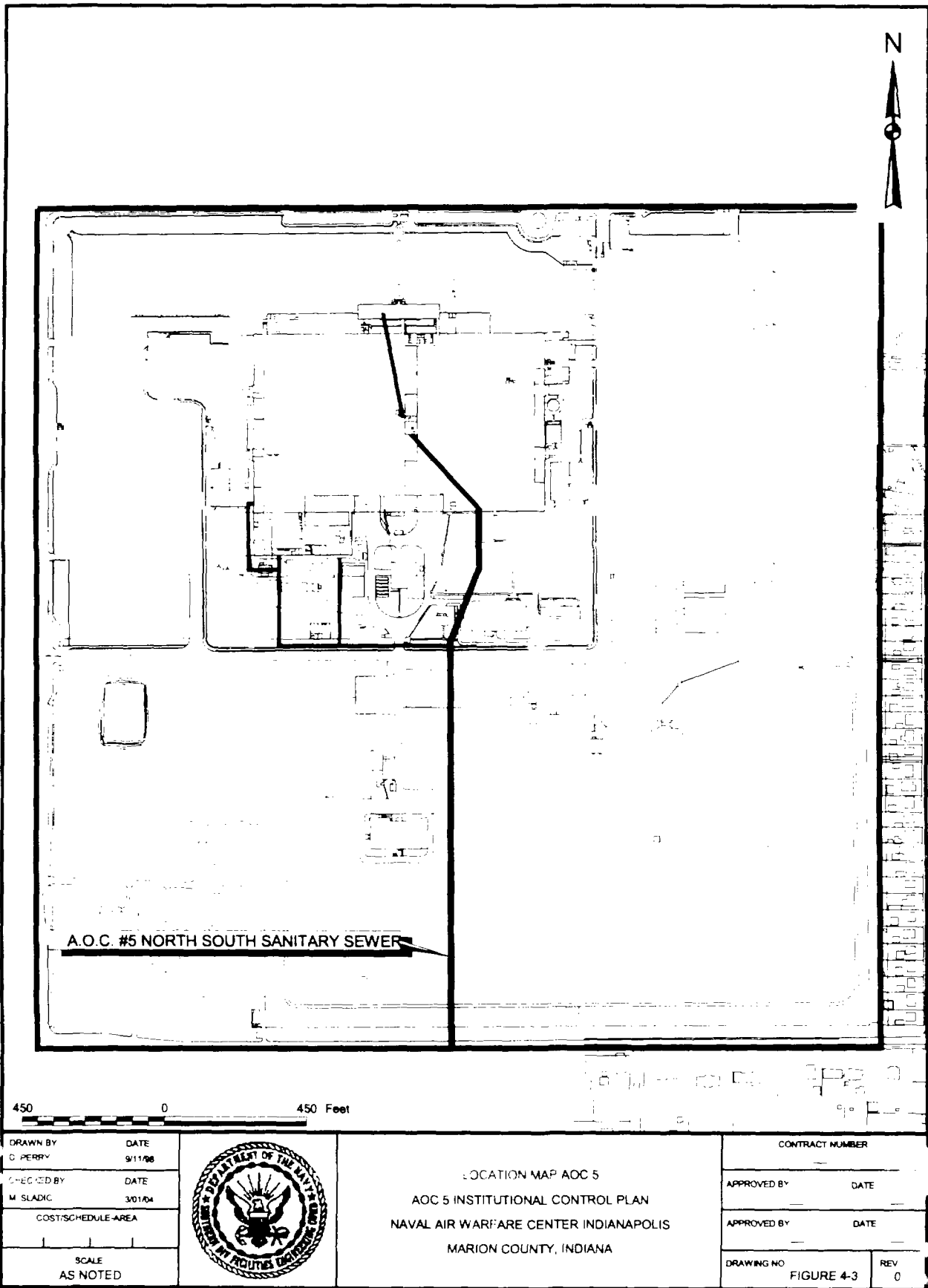
DRAWN BY D. PERRY	DATE 8/25/98
CHECKED BY M. SLADIC	DATE 3/01/04
COST/SCHEDULE-AREA	
SCALE AS NOTED	

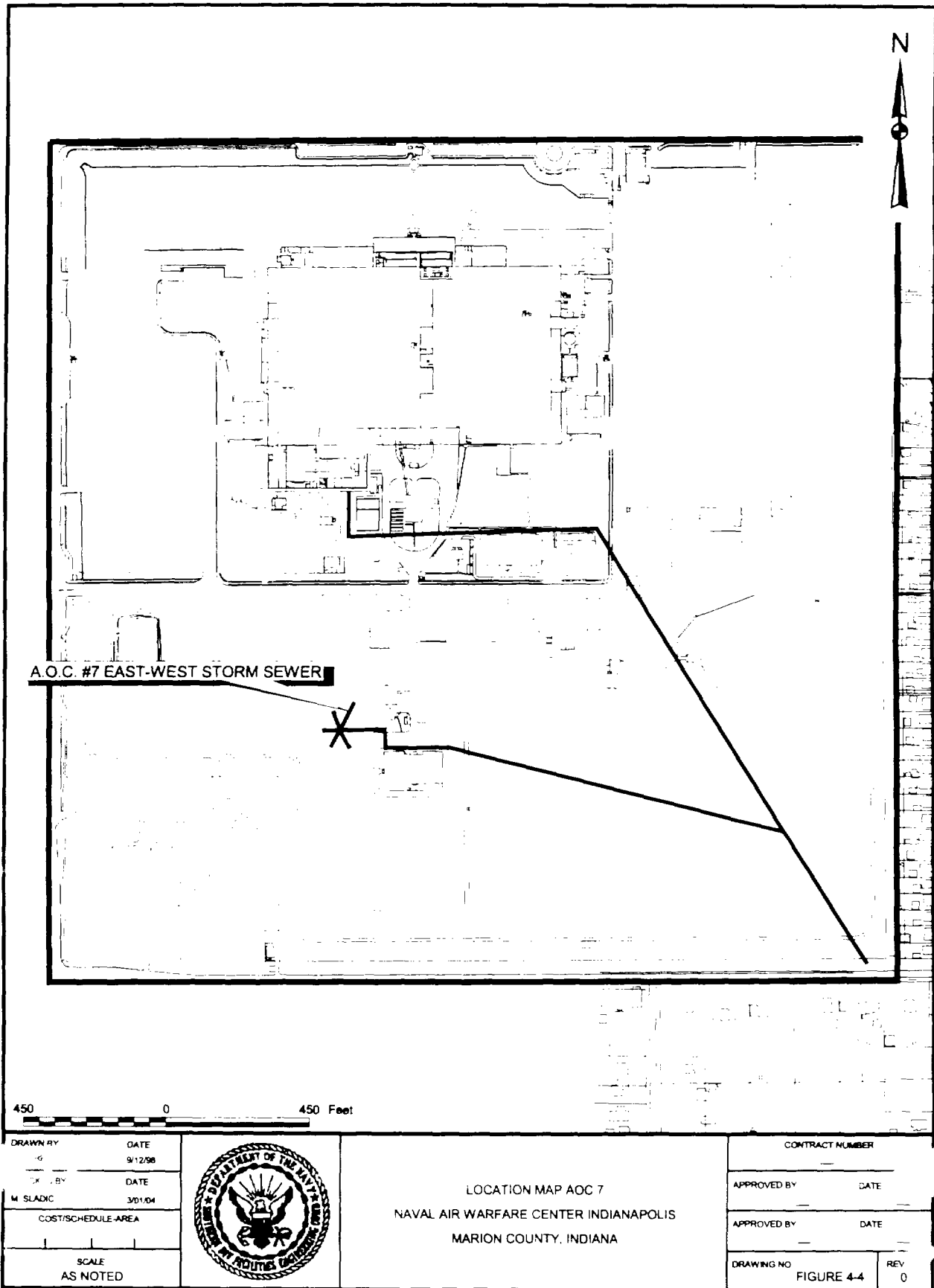


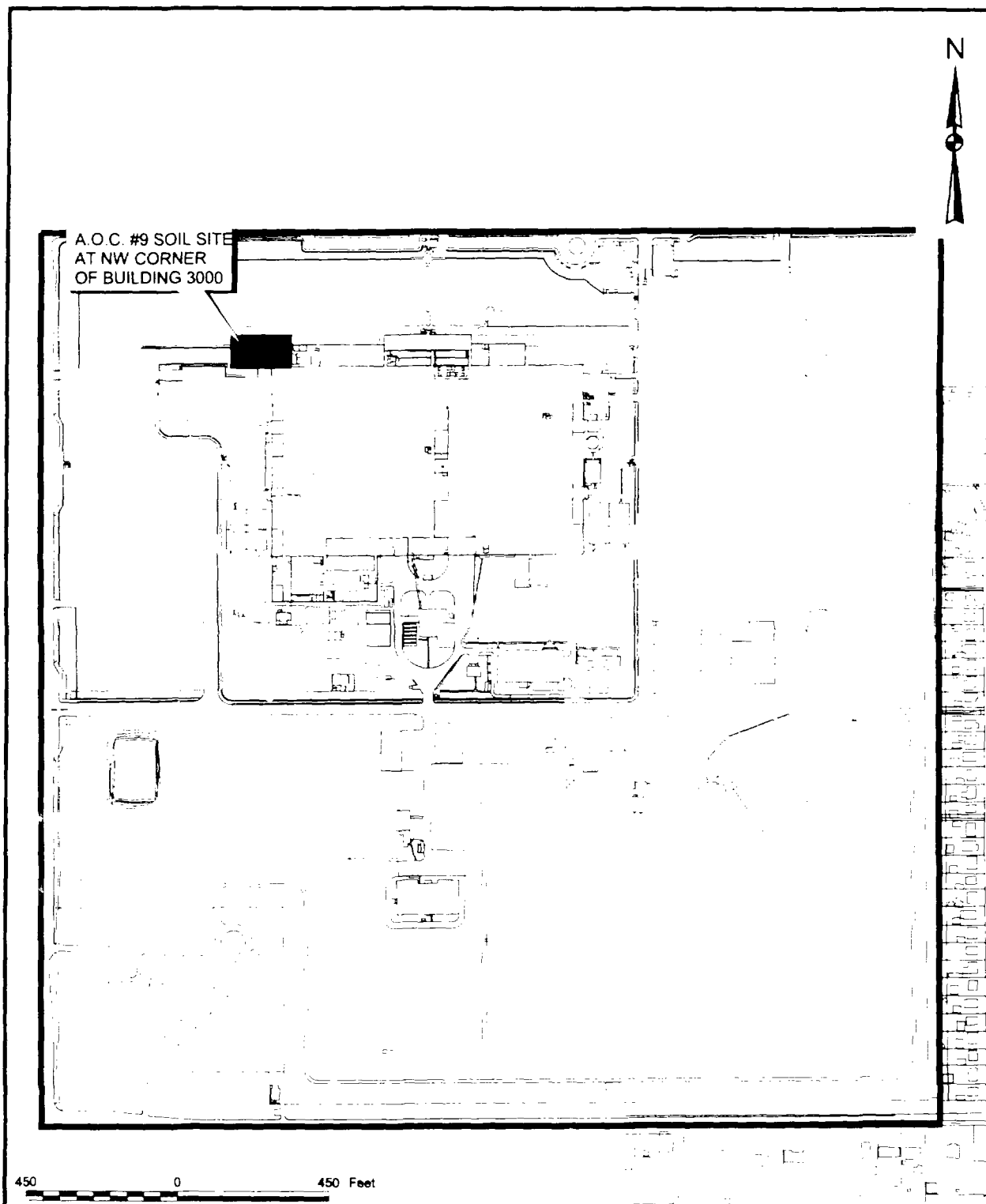
LOCATION MAP AOC 1
NAVAL AIR WARFARE CENTER INDIANAPOLIS
MARION COUNTY, INDIANA

CONTRACT NUMBER	
APPROVED BY	DATE
DRAWING NO. FIGURE 4-1	REV 0

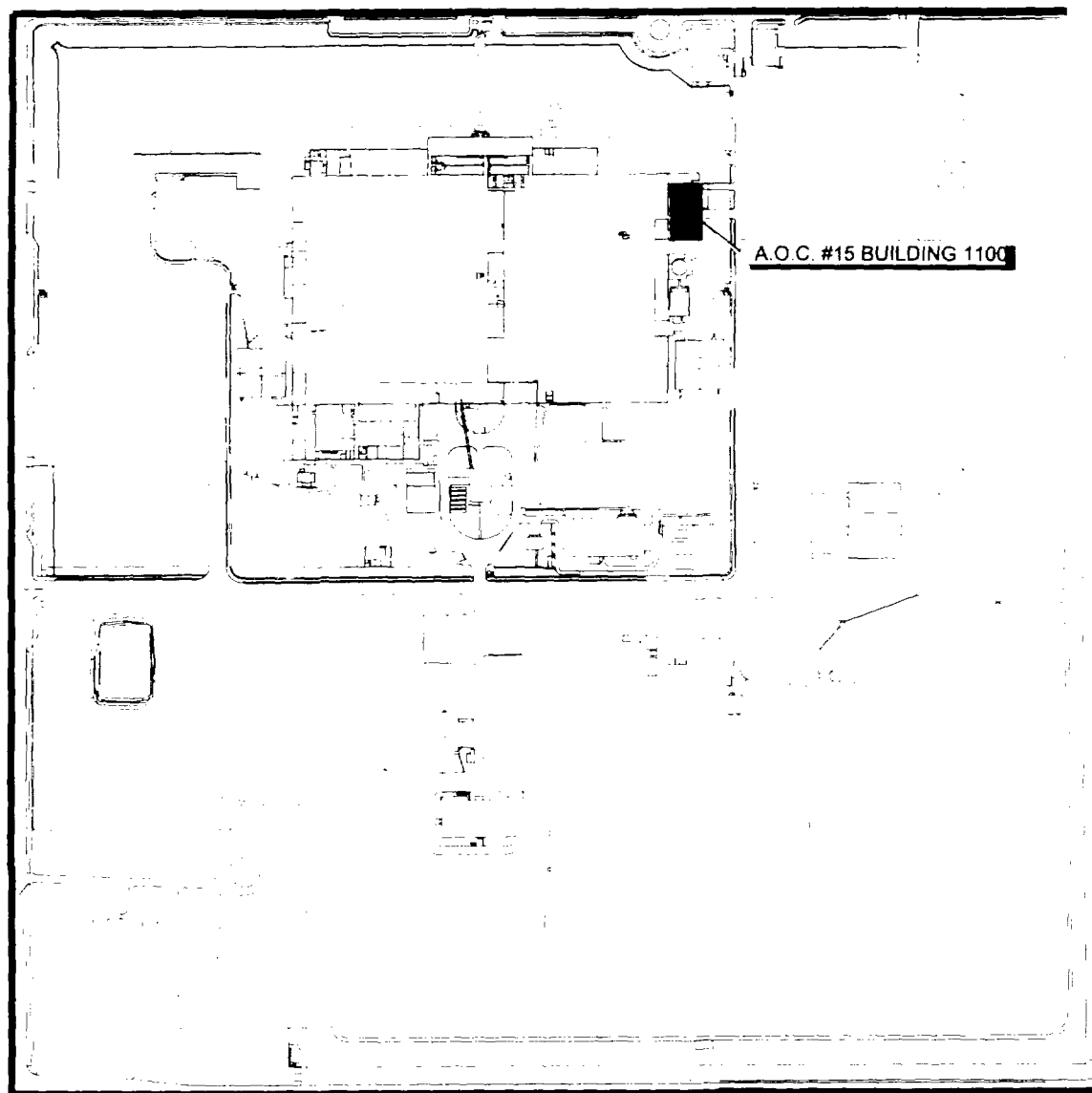








DATE 12/98 PREPARED BY M. SLADIC 3/01/04 COST/SCHEDULE-AREA SCALE AS NOTED			LOCATION MAP AOC 9 NAVAL AIR WARFARE CENTER INDIANAPOLIS MARION COUNTY, INDIANA		CONTRACT NUMBER APPROVED BY _____ DATE _____ APPROVED BY _____ DATE _____ DRAWING NO. FIGURE 4-5 REV. 0	
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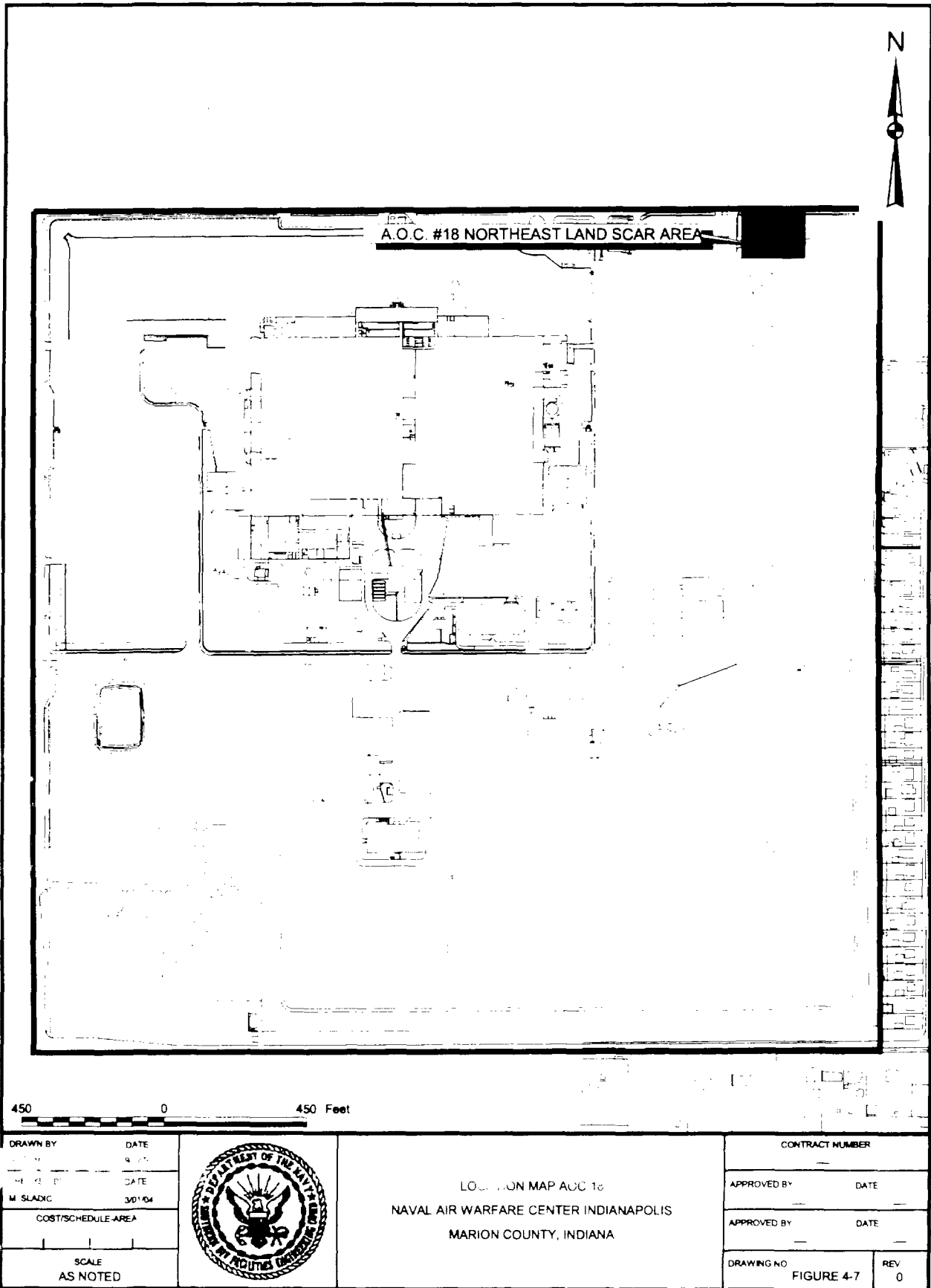
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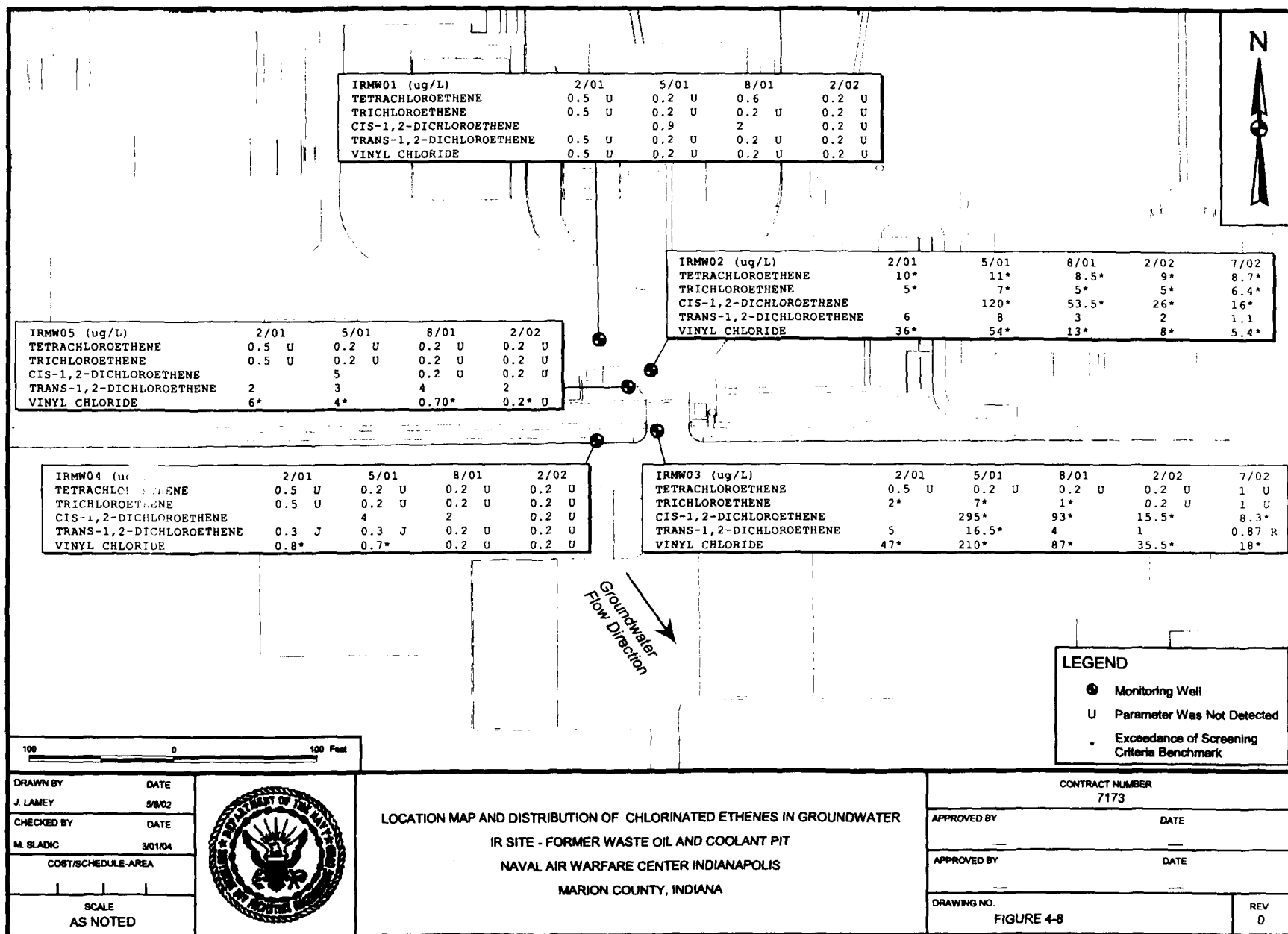
DRAWN BY D. PERRY	DATE 9/2/98
CHECKED BY M. SLADIC	DATE 3/01/04
COST/SCHEDULE-AREA	
SCALE AS NOTED	



LOCATION MAP AOC 15
NAVAL AIR WARFARE CENTER INDIANAPOLIS
MARION COUNTY, INDIANA

COPIES	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO FIGURE 4-6	REV 0







AOC2M02 (ug/l)	7/00	11/00	2/01	5/01	8/01	1/02	5/02	7/02
Volatile Organics								
1,1,1-TRICHLOROETHANE	2600*	2100*	1200*	2100*	2000*	1400*	0.22 U	130*
1,1-DICHLOROETHENE	170*	140*	89*	170*	160*	100*	0.19 U	170 U
ACETONE	2 U	2 U	2 U	15 U	2 U	2 U	1.5 U	5 U
CIS-1,2-DICHLOROETHENE	2 U	0.5 U	0.5 U	2 U	0.2 U	0.2 U	0.21 U	25 U
TRICHLOROETHENE	0.3 U	0.6*	0.3 3*	2 U	0.8*	0.2 U	0.21 U	25 U
Inorganics								
ARSENIC	85	3.7 U	3.7 U	12.4*	4.4*	10.6*	5.2 U	9.4 U
IRON	373	201	797	1150	2640	1480	810	2200
MANGANESE		1060*	547	180	47*	45*	290	456
Filtered Inorganics								
ARSENIC-FILTERED	14.5 U	1.7 U	3.7 U	5.1 U	13.4*	14.1*	5.2 U	11*
IRON-FILTERED		109	809	1300	2240	1470	100	2000
MANGANESE-FILTERED	116	1000*	501	431	480	484	24	410

AOC2M01 (ug/l)	7/00	11/00	2/01	5/01	8/01	1/02	5/02	7/02
Volatile Organics								
1,1,1-TRICHLOROETHANE	0.8 U	0.3 U	0.7 U	0.2 U	0.2 U	0.2 U	0.22 U	1 U
1,1-DICHLOROETHENE	1	0.8	0.9	0.8	0.8*	0.7 3	0.54 7	0.46 U
ACETONE	2 U	2 U	2 U	2 U	2 U	2 U	1.5 U	5 U
CIS-1,2-DICHLOROETHENE	10	8	8	8	8	8	4.7	6.7
TRICHLOROETHENE	0.3 U	0.1 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	25 U
Inorganics								
ARSENIC		3.7 U	3.7 U	11.2*	5.3 U	5.3 U	5.2 U	10 U
IRON	172	129	97.7	177	180.5	41.7 U	40 U	57 U
MANGANESE	1120*	913*	892*	845	791.5	718	760	790
Filtered Inorganics								
ARSENIC-FILTERED		3.7 U	3.7 U	5.1 U	7.3*	5.4 3*	5.2 U	10 U
IRON-FILTERED	91	110	102	194	82.4	43.7 U	200 U	50 U
MANGANESE-FILTERED	1050*	904*	895*	828	807	757	740	720

AOC2M03 (ug/l)	7/00	11/00	2/01	5/01	8/01	1/02	5/02	7/02
Volatile Organics								
1,1,1-TRICHLOROETHANE	11	4	210*	9	8	22	0.22 U	1 U
1,1-DICHLOROETHENE	1	0.8 U	19*	0.5 U	1	0.2 U	0.19 U	1 U
ACETONE	6 3	2 U	2 U	2 U	2 U	2 U	1.5 U	5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	1 U
TRICHLOROETHENE	0.3 U	0.1 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	25 U
Inorganics								
ARSENIC		3.7 U	3.7 U	5.3 U	5.3 U	5.3 U	5.2 U	10 U
IRON	12200*	799	140	181	217	941	55	55
MANGANESE	572	174	134	980*	138	69	26	45.5
Filtered Inorganics								
ARSENIC-FILTERED		3.7 U	3.7 U	1.8 U	5.3 U	5.3 U	5.2 U	10 U
IRON-FILTERED	37	69.1 U	23.6	224	22.6 U	218 U	40 U	250 U
MANGANESE-FILTERED	57	96	137	119	201	49	27	41

- Monitoring Well
- Parameter Not Detected
- Value is Considered to be Unreliable or Unusable
- Value is an Estimated Concentration
- Exceedance of EPA MCL, EPA Region 9 PRG or IDEM Closure Level

100 0 100 Feet

NO	DATE	REVISIONS	BY	CHKD	APPO	REFERENCES	DRAWN BY A. JANOWA	DATE 12/03/02		CHEMICALS DETECTED IN GROUNDWATER AOC 2 - NEW PLATING AREA IN BUILDING 1200 NAVAL AIR WARFARE CENTER INDIANAPOLIS MARION COUNTY, INDIANA	CONTRACT NO. 7173
						CHECKED BY M. SLACIC	DATE 3/01/04	APPROVED BY			DATE
						COST/ESTIMATED AREA		APPROVED BY			DATE
						SCALE AS NOTED		DRAWING NO. FIGURE 4 - 9			REV. 0



AOC4NMW6 (UG/L)	7/00	10/00	2/01	5/01	8/01	1/02	5/02	7/02
Volatile Organics								
1,1,1-TRICHLOROETHANE	195	220*	160	180	210*	100	160	200
1,1,2-DICHLOROETHANE	8*	45*	12*	41*	52*	32*	30*	43*
ACETONE	2 U	2 U	2 U	2 U	2 U	1.5 U	5 U	5 U
CIS-1,2-DICHLOROETHENE	13.5	11	8	6	13	20	11	33
TRICHLOROETHENE	18*	15*	20*	32*	16*	28*	29*	40*
VINYL CHLORIDE	1*	4*	4*	3*	5*	6*	4*	8.6*
Inorganics								
ARSENIC		1.7 U	3.7 U	11.2*	5.3 U	5.1 U	5.2 U	10 U
IRON	86.7	319	720	217	579	278	40 U	77
MANGANESE	67.2	44	785	80.5	140	214	87	190
Filtered Inorganics								
ARSENIC-FILTERED		1.7 U	3.7 U	6.1 U*	5.3 U	5.1 U	5.2 U	10 U
IRON-FILTERED	5.7 U	14.3 U	61.8	22.6 U	22.6 U	218 U	200 U	25 U
MANGANESE-FILTERED	66.2	23.4	766	82.8	134	103	73	130

AOC4NMW6 (UG/L)	7/00	10/00	2/01	5/01	8/01	1/02	5/02	7/02
Volatile Organics								
1,1,1-TRICHLOROETHANE	0.3 U	8.5	4	6	8	0.2 U	0.22 U	8
1,1,2-DICHLOROETHANE	0.3 U	0.3 U	0.5 U	0.2 U	0.6	0.2 U	0.19 U	0.14 U
ACETONE	2 U	2 U	2 U	2 U	2 U	1.5 U	5 U	5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.21 U	1 U	1 U
TRICHLOROETHENE	0.3 U	0.6 U*	0.5 U*	0.3 U*	0.2 U	0.2 U	0.21 U	0.46 U
VINYL CHLORIDE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.18 U	1 U	1 U
Inorganics								
ARSENIC		3.7 U	1.7 U	5.1 U	5.3 U*	5.1 U	5.2 U	10 U
IRON	993	821.5	3440	734	2180	897	2200	1300
MANGANESE	407	187.5	128	408	102	286	110	180
Filtered Inorganics								
ARSENIC-FILTERED		3.7 U	3.1 U	5.3 U	5.3 U*	5.1 U	5.2 U	10 U
IRON-FILTERED	717	47.9	19.8 U	15.1 U	22.6 U	218 U	40 U	50 U
MANGANESE-FILTERED	336	167	300	354	182	210	25	230

AOC4NMW6 (UG/L)	7/00	10/00	2/01	5/01	8/01	1/02	5/02	7/02
Volatile Organics								
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.22 U	1 U
1,1,2-DICHLOROETHANE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.19 U	2 U
ACETONE	2 U	2 U	2 U	2 U	2 U	2 U	1.5 U	5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	1 U
TRICHLOROETHENE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	1 U
VINYL CHLORIDE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.18 U	1 U
Inorganics								
ARSENIC		5.9*	1.7 U	5.3 U	5.3 U	5.8 U*	5.2 U	10 U
IRON	190	1000	10400	1880	1605	4410	1700	1800
MANGANESE	219	274	308	204	269.5	275	200	380
Filtered Inorganics								
ARSENIC-FILTERED		3.7 U	1.7 U	5.3 U*	5.3 U	5.1 U	5.2 U	10 U
IRON-FILTERED	29.5	242	19.8 U	22.6 U	15.1 U	218 U	40 U	50 U
MANGANESE-FILTERED	206	182	14.1	14.5	160.5	146	74	32

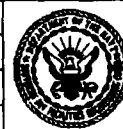
AOC4NMW6 (UG/L)	7/00	10/00	2/01	5/01	8/01	1/02	5/02	7/02
Volatile Organics								
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.22 U	1 U
1,1,2-DICHLOROETHANE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.19 U	1 U
ACETONE	2 U	2 U	2 U	2 U	2 U	2 U	1.5 U	5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	1 U
TRICHLOROETHENE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	1 U
VINYL CHLORIDE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.18 U	1 U
Inorganics								
ARSENIC		3.7 U	3.7 U	5.3 U	5.3 U	5.3 U	5.2 U	10 U
IRON	455	523	188 U	1280	218	1530	170	540
MANGANESE	847	801	774	87.1	754	766	780	860
Filtered Inorganics								
ARSENIC-FILTERED		3.7 U	3.7 U	5.3 U	5.3 U	5.3 U	5.2 U	10 U
IRON-FILTERED	308	277	114	22.6 U	288	279	180	220
MANGANESE-FILTERED	828	734	778 U	110	785	749	790	780

AOC4NMW6 (UG/L)	7/00	10/00	2/01	5/01	8/01	1/02	5/02	7/02
Volatile Organics								
1,1,1-TRICHLOROETHANE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.22 U	1 U
1,1,2-DICHLOROETHANE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.19 U	1 U
ACETONE	2 U	2 U	2 U	2 U	2 U	2 U	1.5 U	5 U
CIS-1,2-DICHLOROETHENE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	1 U
TRICHLOROETHENE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.21 U	1 U
VINYL CHLORIDE	0.3 U	0.3 U	0.5 U	0.2 U	0.2 U	0.2 U	0.18 U	1 U
Inorganics								
ARSENIC		1.7 U	3.7 U	5.3 U	5.3 U	5.3 U	5.2 U	10 U
IRON	71.2	137	1070	121	81.8	210	101.5	160
MANGANESE	211	459	1073*	465	1060*	1370*	170	1200*
Filtered Inorganics								
ARSENIC-FILTERED		1.7 U	3.7 U	5.3 U*	5.3 U	5.3 U	5.2 U	10 U
IRON-FILTERED	5.7 U	17.5 U	39.4	22.6 U	22.6 U	218 U	40 U	250 U
MANGANESE-FILTERED	151	248	27.6	85.1	104	67.9	12	82

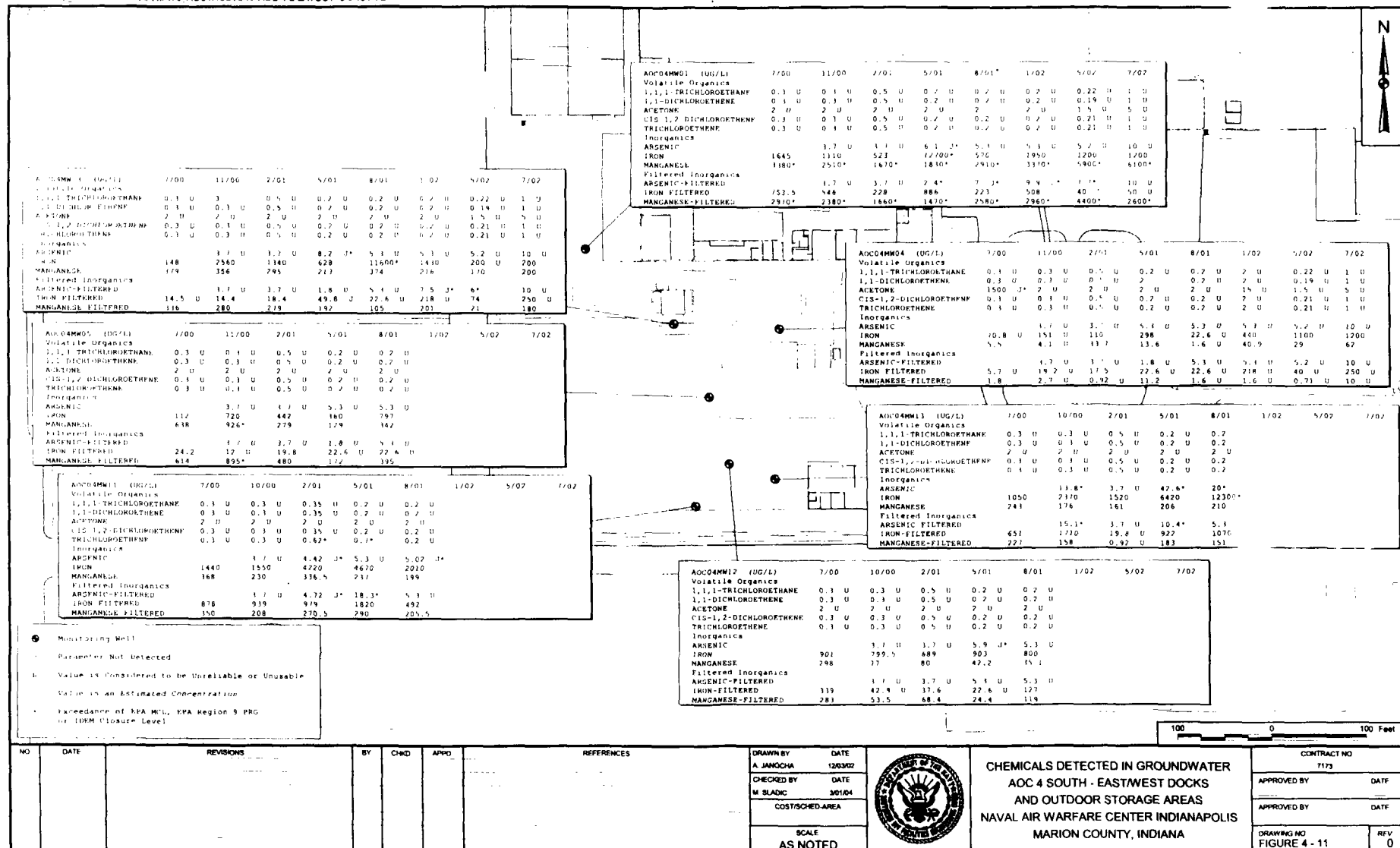
- Monitoring Well
- Parameter Not Detected
- Value is Considered to be Unreliable or Unusable
- Value is an Estimated Concentration
- Exceedence of EPA MCL, EPA Region 9 PRC or IDRM Closure Level

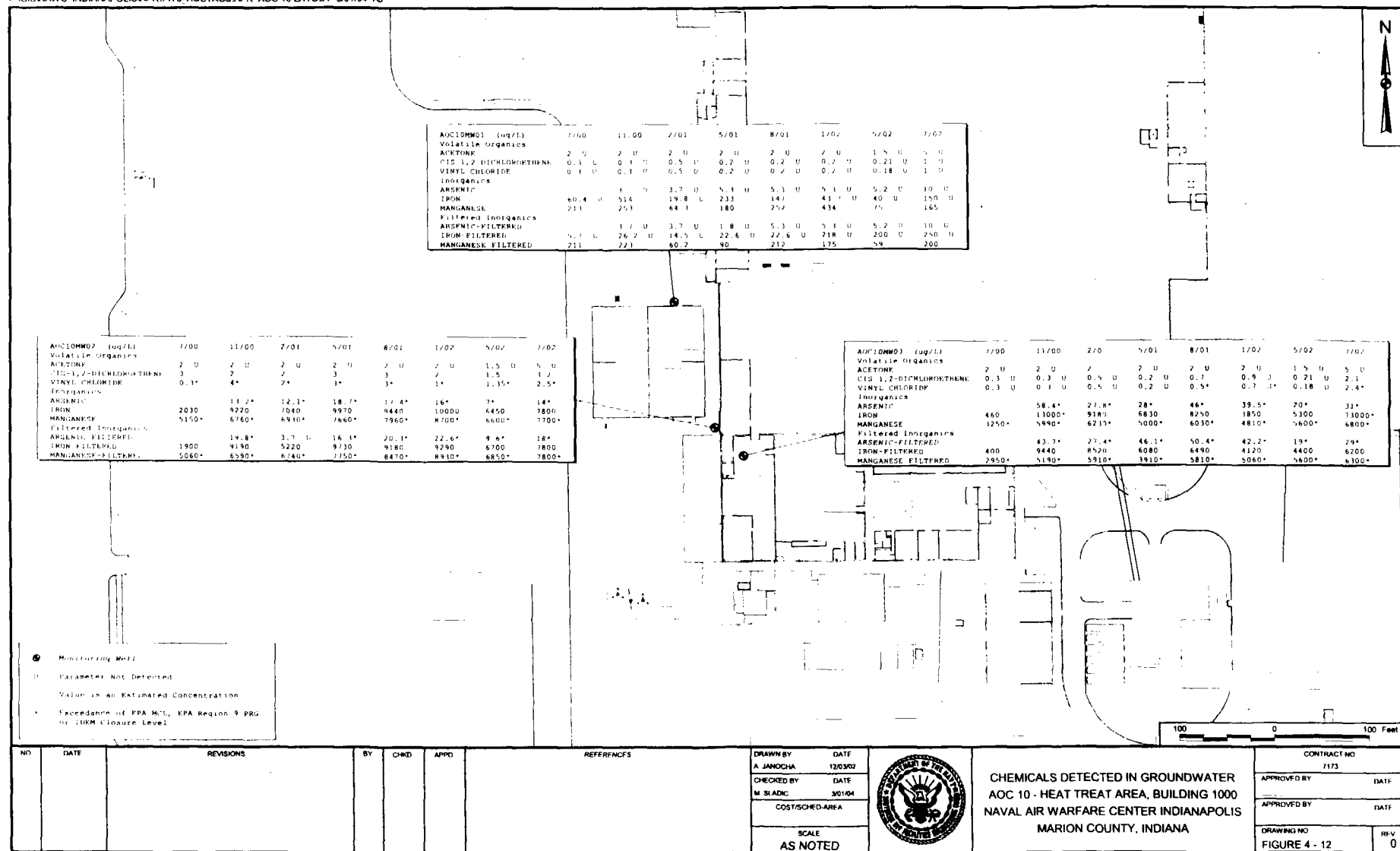
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NO	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY	DATE	CONTRACT NO
							A. JANDORA	12/3/02	7173
							CHECKED BY	DATE	APPROVED BY
							M. SLADIC	3/01/04	DATE
							COST/CHD-AREA		APPROVED BY
							SCALE		DATE
							AS NOTED		DRAWING NO
									FIGURE 4 - 10
									REV
									0



CHEMICALS DETECTED IN GROUNDWATER
AOC 4 NORTH - EAST/WEST DOCKS
AND OUTDOOR STORAGE AREAS
NAVAL AIR WARFARE CENTER INDIANAPOLIS
MARION COUNTY, INDIANA





CHEMICALS DETECTED IN GROUNDWATER
AOC 10 - HEAT TREAT AREA, BUILDING 1000
NAVAL AIR WARFARE CENTER INDIANAPOLIS
MARION COUNTY, INDIANA

CONTRACT NO 7173	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO FIGURE 4 - 12	REV 0

NO	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY A. JANOWA	DATE 12/3/02
CHECKED BY M. SEADIC	DATE 3/01/04
COST/SCHED AREA	
SCALE AS NOTED	

AOC16M09 (ug/L)	7/00	10/00	2/01	5/01	8/01	1/02	7/02
Volatile Organics							
1,1,1-TRICHLOROETHANE	860*	260*	280*	110	220*	38	11
1,1,2-DICHLOROETHANE	200*	50*	50*	19*	19*	6	11
ACETONE	100	2	2	2	2	18	24
CIS-1,2-DICHLOROETHENE	2	0.3	0.6	0.2	0.2	165*	120*
TRICHLOROETHENE	1000*	470*	520*	220*	540*	16.5*	1*
Inorganics							
ARSENIC		1.1	1.1	5.4	9.6	17.15*	10.8
IRON	20.5	253	1240	228	5270	12840*	6130
MANGANESE	162	88.8	45.9	15.5	1930*	1089*	290
Filtered Inorganics							
ARSENIC-FILTERED		1.1	1.1	5.4	10*	17.6*	17*
IRON-FILTERED	5.1	12	19.8	22.6	5280	17150*	7600
MANGANESE-FILTERED	158	70.4	19	5.9	2050*	1180*	140

AOC16M08 (ug/L)	7/00	10/00	2/01	5/01	8/01	1/02	7/02
Volatile Organics							
1,1,1-TRICHLOROETHANE	0.3	0.3	0.5	0.2	0.2	0.2	1
1,1,2-DICHLOROETHANE	0.3	0.3	0.5	0.2	0.2	0.2	1
ACETONE	2	2	2	2	2	2	5
CIS-1,2-DICHLOROETHENE	0.1	0.3	0.5	0.2	0.2	0.2	1
TRICHLOROETHENE	0.3	0.6*	0.5	0.2	2*	2*	1
Inorganics							
ARSENIC		8.9*	1.2	5.3	5.3	6.1	10
IRON	231	16800*	2260	1180	1320	1980	420
MANGANESE	127	595	331	544	167	440	560
Filtered Inorganics							
ARSENIC-FILTERED		3.7	3.7	5.3	7.3*	8.4	10
IRON-FILTERED	12.5	1990	2210	816	188	800	410
MANGANESE-FILTERED	122	164	402	538	180	472	180

AOC16M07 (ug/L)	7/00	10/00	2/01	5/01	8/01	1/02	7/02
Volatile Organics							
1,1,1-TRICHLOROETHANE	0.3	0.3	0.5	0.2	0.2	0.2	1
1,1,2-DICHLOROETHANE	0.3	0.3	0.5	0.2	0.2	0.2	1
ACETONE	2	2	2	2	2	2	5
CIS-1,2-DICHLOROETHENE	0.1	0.3	0.5	0.2	0.2	0.2	1
TRICHLOROETHENE	0.3	0.3	0.5	0.2	2*	0.7	1
Inorganics							
ARSENIC		1.1	1.1	5.3	5.3	5.3	10
IRON	22.1	2770	1450	192	179	131	500
MANGANESE	687	444	367	155	219	227	400
Filtered Inorganics							
ARSENIC-FILTERED		3.7	3.7	5.3	7.1*	7.3*	6.2
IRON-FILTERED	11.5	49.9	11	22.6	22.6	218	500
MANGANESE-FILTERED	612	312	375	389	227	236	410


AOC16M10 (ug/L)	7/00	10/00	2/01	5/01	8/01	1/02	7/02
Volatile Organics							
1,1,1-TRICHLOROETHANE	0.2	0.2	0.2	0.2	0.2	0.2	1
1,1,2-DICHLOROETHANE	0.2	0.2	0.2	0.2	0.2	0.2	1
ACETONE	2	2	2	2	2	2	5
CIS-1,2-DICHLOROETHENE	0.2	0.2	0.2	0.2	0.2	0.2	1
TRICHLOROETHENE	0.2	0.2	0.2	0.2	0.2	0.2	1
Inorganics							
ARSENIC		12.6*	1.1	10	10	10	10
IRON	258*	18800*	314	10000			
MANGANESE	454	194	4.9	160			
Filtered Inorganics							
ARSENIC-FILTERED		1.8	5.3	4.4	10	10	10
IRON-FILTERED	15.2	22.6	218	50	50	50	50
MANGANESE-FILTERED	111.4	1.4	1.6	10	10	10	10

AOC16M04 (ug/L)	7/00	10/00	2/01	5/01	8/01	1/02	7/02
Volatile Organics							
1,1,1-TRICHLOROETHANE	350*	670*	540*	170*	340*		180
1,1,2-DICHLOROETHANE	20*	43*	20*	18*	22*		2
ACETONE	2	2	2	2	2	2	5
CIS-1,2-DICHLOROETHENE	0.1	0.3	0.5	0.2	0.2	0.2	1
TRICHLOROETHENE	0.3	0.6*	0.5	0.2	0.4	0.4	1
Inorganics							
ARSENIC		3.7	3.7	5.3	17.8*		10
IRON	448	912	481	6290	5250		3000
MANGANESE	152	97	149*	535	656		200
Filtered Inorganics							
ARSENIC-FILTERED		3.7	3.7	12.6*	1.4	1.4	1.1
IRON-FILTERED	5.1	12	42*	6020	2770		2400
MANGANESE-FILTERED	30.9	21.5	119*	719	692		180

AOC16M06 (ug/L)	7/00	10/00	2/01	5/01	8/01	1/02	7/02
Volatile Organics							
1,1,1-TRICHLOROETHANE	0.1	0.1	0.5	0.2	0.2	0.2	1
1,1,2-DICHLOROETHANE	0.1	0.1	0.5	0.2	0.2	0.2	1
ACETONE	2	2	2	2	2	2	5
CIS-1,2-DICHLOROETHENE	0.1	0.3	0.5	0.2	0.2	0.2	1
TRICHLOROETHENE	0.1	0.3	0.5	0.2	0.2	0.2	1
Inorganics							
ARSENIC		3.7	3.7	5.3	5.3	5.3	10
IRON	29.4	146	315	175	1240	41.7	400
MANGANESE	45.4	22.6	32.9	16.6	41.9	7.8	15
Filtered Inorganics							
ARSENIC-FILTERED		3.7	3.7	5.3	5.3	5.3	10
IRON-FILTERED	5.1	12	19.8	22.6	22.6	218	500
MANGANESE-FILTERED	44.1	16.2	22.7	6.9	12	13.1	4.9

Monitoring Well:
Parameter Not Detected
Value is an estimated concentration
Exceedance of EPA MCL, EPA Region 9 PRG
or DCM Closure Level

100 0 100 Feet

NO	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY A. JANCOSIA 12/03/07	DATE 12/03/07		CHEMICALS DETECTED IN GROUNDWATER AOC 16 - THE EXPERIMENTAL PLATING LABORATORY BUILDING 5000 NAVAL AIR WARFARE CENTER, INDIANAPOLIS MARION COUNTY, INDIANA	CONTRACT NO. 7173
						CHECKED BY M. SLADIC 3/01/04	DATE 3/01/04	APPROVED BY			DATE
						COST/SGED AREA		DESIGN/SGED AREA			DATE
						SCALE AS NOTED		DRAWING NO. FIGURE 4 - 13			REV 0